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Dedicated to the Conservation of Virginia's Wildlife and Related Natural Resources

This month, *Virginia Wildlife* brings you the story of the Commission of Game and Inland Fisheries. The Commission is entrusted with the responsibility for managing the state's wildlife resources. What does this mean? As you'll see in the pages of this month's special issue, it means many, many things, from scent post studies to public service announcements, from fish stocking to boat titling, from hunter safety to undercover law enforcement. Turn the page to see how your license fees—and soon, your donations—have been and will be spent.

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Game Warden Mike Minarik with a young bobcat about to be released into the wild. *Photo by Spike Knuth.*

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The Commission

Francis N. Satterlee

Left to right, seated: Dr. Hoffman, Mr. Everest, Mr. Cross, Mr. Leveridge. Standing: Mr. Sutton, Dr. Sheppard, Dr. Knight, Mr. Chapman, Mr. Potter, Mr. Bowie. Not pictured: Mr. Spain.

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Representing the counties of Arlington and Loudoun and part of Fairfax and the cities of Fairfax and Falls Church.

Administration

Blueprint for Wildlife Management

Richard H. Cross, Jr., Executive Director

Spike Knuth

Within the covers of this special issue of *Virginia Wildlife* you will find a comprehensive report of our current and most recent accomplishments in fish and wildlife management and associated fields.

Briefly stated, our mission is to:

- Make lands and inland waters throughout Virginia produce sustained annual crops of wildlife and freshwater fish for recreational use.
- Regulate the annual harvest of game and freshwater fish.
- Promote safety for persons and property in connection with the use, operation and equipment of vessels and promote uniformity of laws relating thereto.
- Provide year-round protection for fish and wildlife through adequate enforcement of laws and regulations.
- Provide educational materials and programs pertaining to freshwater fish and wildlife.
- Acquire lands and waters and develop facilities for public hunting, fishing and associated outdoor recreation.

Virginia is a commonwealth of some 5,000,000 people who share its 25,407,000 acres. In fiscal year 1979-80 our agency issued 903,645 hunting and fishing licenses to Virginia residents and another 38,224 licenses to visitors to our state. In the same year, those persons who hunted and fished spent a total of 14,300,000 user-days afield or afloat, while another 28,000 days were being enjoyed by non-consumptive users interested in wildlife photography, bird watching and other related activities.

As Virginia continues to be home to more people and more industry, we will develop new techniques to assure fish and wildlife their rightful place in this growing economy. The use of modern computer resources and systems of information management will open new dimensions in the fields of research and administration. A current comprehensive study of the Game Commission's structure and functions will result in specific recommendations to improve our efficiency in managing these resources and serving the public.

The Commission of Game and Inland Fisheries is looking ahead and is preparing to meet the challenges of the future. □

A New Era in Fish and Game Management

John P. Randolph, Deputy Assistant Director

Recently one of the nation's leading marine biologists was overheard saying, "All we need is another fifty years of data."

This may well be one of the major differences between freshwater fish and wildlife biology and marine biology. The latter is a relatively young science, one in which the necessary data required to manage fish and marine mammals are only a few years old and a great deal more is required to unravel many of the biological mysteries of the sea.

The study of freshwater fish and of wildlife is relatively older than marine biology and a great deal of data have been accumulated, which is another way of saying a lot of things have been tried, a few of which worked, but most of which failed.

Since the study of wildlife and freshwater fish got into high gear, many philosophies have had their day and have since bitten the dust. Some techniques worked beautifully but change was required when the problem changed. One of the characteristics of management techniques for fish and wildlife is that few can be put into practice without educating the public and enlisting public support. But as soon as a given problem is solved, we're faced with re-educating the public as we go charging off in a new direction.

An excellent example of this is the deer management philosophy in effect in Virginia. Years ago, when we had few deer, it was necessary to provide the females with strict protection so that the herds could grow. The public had little difficulty accepting the "bucks only" management philosophy and they responded beautifully.

And it did the job. With strict protection and general public obedience to the law, the deer herds grew to the limits allowed by the available habitat. Now, with deer herds at record proportions, the problem is no longer one of building the herds. Now, it is keeping the animals in balance with the available habitat. The bucks-only was a herd-building philosophy, not one designed to maintain the delicate balance. And now many hunters refuse to espouse any other philosophy.

Although the deer herd in Virginia is now estimated at some 400,000 animals, individual hunters and hunt clubs seem to want more deer. In most cases, the land is supporting more deer than it should, sort of like trying to graze 40 head of cattle on pasture that can handle only 20. The result is a poorer animal, a condition that invites disease to come in and cull the herd. This is also true of deer. If hunters will not keep the herd in balance, disease, parasites or starvation will.

The new deer management philosophy is evident in our deer hunting laws. Each county is managed in accordance with the deer population found there. The bag limits and number of antlerless deer days permitted are designed to produce a precise harvest that will have the desired effect on the deer population. This cannot work if hunters refuse to harvest their share of does.

Dennis Martin

Our game managers are employing a new technique in providing food and cover to wildlife. For many years, the Commission operated an annual game feed patch program. Seed was provided to clubs and private organizations for thousands of annual feed patches across the state.

Years of study and close observation revealed that the feed patches were not providing food during the lean winter and early spring months when it was most needed. Instead, the peak production of the feed patches occurred when other grains and mast were plentiful. The food patch served more as a game concentrator, like an artificial reef used to concentrate fish. It was of little benefit to the game.

In this case, the problem was redefined. The need was to improve food and cover at the time of the year when it was needed most. If the winter carrying capacity of land can be improved, more animals will survive and populations would be substantially larger. So the Commission now encourages the planting of perennials to support wildlife, and the use of natural plants and shrubs wherever possible.

We discovered on Commission-owned lands that it was not necessary to place food patches in forest clearings. The clearing itself provided the environment where natural grasses and shrubs occurred and provided the highest quality food and cover. Forest manipulation, rather than planting, proved more beneficial.

One problem that the new-era wildlife manager must overcome is the loss of habitat to new, clean farming methods. Years ago, sub-standard lands were permitted to lie fallow and hedgerows separated many fields. The

fallow areas, once game cover, are planted to crops these days and the hedgerows are quickly disapperaring.

New methods of harvesting hay, employing the roll balers, are more efficient and have made it possible to economically harvest hay on substandard fields. This practice is proving detrimental to quail nesting and may be affecting other species as well.

The use of herbicides has removed the weeds usually found in many cultivated fields, thereby eliminating a source of cover and small weed seeds from the habitat. Clean harvesting methods are leaving very little grain in the fields to benefit wildlife.

While modern, efficient farming methods benefit the farmer and us, the consumers, wildlife is paying the price. Programs must be developed to work with farmers to provide plans for farms that will enhance small game production on whatever lands are not under cultivation. Commission biologists offer this extension service to landowners who request it. In addition to advice, however, some incentives must be developed to encourage more wildlife on farmlands.

About 80 percent of Virginia's hunting lands are privately owned. The Commission will continue to work to arrange cooperative agreements with large landowners, but one-on-one hunter-landowner programs must be encouraged to develop mutually supportive projects that benefit the owner, the hunter and wildlife.

Featured in the new era of wildlife management is the concept of the total ecosystem. All wildlife, except for marine mammals and fish are within the scope of the Commission of Game and Inland Fisheries. Some years ago, the Commission began broadening its horizons, investigating such non-game species as the southern bald eagle and the red-cockaded woodpecker. We produced publications dealing with such non-game species as song birds, snakes, and others, as well as "how-to" publications which help Virginians improve backyard habitats for birds, attract birds, and build bird houses.

This year, the Commission will launch a new program dealing with all wildlife, including game, non-game, threatened and endangered, and heretofore ignored species. This program is broad and will advance on many fronts.

Backed primarily with funds obtained from those who contribute part of their state income tax refunds or make direct contributions, the program will go a long way towards unraveling the complex relationships that exist between wildlife and man. For a more detailed discussion of the non-game program see the Non-Game Program article in this issue.

Fishery managers have also learned lessons over the years that will prove useful in the future. Just as the game manager discovered that it was worse than useless to stock such animals as rabbits and quail, the fishery manager discovered that the stocking of catchable size warmwater fish wasted sportsmen's money. Just as game managers learned that game must have food to survive, the fishery manager now works diligently to provide a base of forage fish to feed populations of the more desirable predators. Stocking is not performed where natural reproduction meets the demands. Hatchery operations are geared to providing fish required to establish fisheries where none now exist or to sustain fisheries where natural reproduction cannot occur or must be augmented.

A growing problem in fishery management is providing access for anglers, particularly in the highly lucrative intertidal zone. The brackish water stretches of many of our rivers, from the fall lines down to the point where sea water content is too heavy for freshwater fish, offer some of the best freshwater fishing in Virginia, particularly in the tidal creeks that feed into these waters. Unfortunately, access to these areas is limited and many anglers are denied this highly productive fishing.

While the combination of research and biology plays a large role in fish and wildlife management, it is but one point of the triangle which is completed by adding education and law enforcement, both of which are equally important.

In the new era of fish and wildlife management, the education division will employ new technologies to bring the Game Commission story to the public. Now equipped to produce videotape for television, the education division will enhance public contact through this medium. Spot announcements, full-length television programs and televised news releases are only a few of the plans. The education staff will use radio more, and will make a greater effort to reach the public through a Commission speakers' bureau and through a myriad of new publications.

Law enforcement, employing superbly trained personnel using the latest scientific methods, will continue to make violation of fish and game laws a risky business. Game wardens learn new investigative procedures such as determining the time of death of animals taken illegally. The use of an improved and improving communications system, better watercraft and aircraft, and more off-road vehicles will enable our game wardens to advance with the state of the science of modern law enforcement techniques. The Virginia game warden force, the most effective in the nation in 1980, continues to improve.

The greatest stride forward in this new era can be made by the sportsmen themselves. The time for dedication to the principles of sportsmanship is long past. The need for greater respect for the wildlife and the land we hunt on remains one of the primary issues of the day.

In order for the findings of our excellent biologists to pay dividends, the need remains to implement them through educated sportsmen. The vital need for sportsmen to keep abreast of new biological developments and to understand their role in implementing them has never been greater. Actually, successful wildlife management is not a triangle, it is a square. The fourth and most important corner is occupied by Virginia's half-million sportsmen who use the state's wildlife resources and support this organization. Of course, in the near future, sportsmen will not have to bear this responsibility alone as taxpayers commence to contribute a part of their state tax refunds. Perhaps the fourth corner of the square can best be described as all of Virginia's citizens.

As we move into this new era with our space-age technology, we must remember that we continue to deal with Iron-Age attitudes. Thus far, our wildlife has shown that it can adapt to many changes; perhaps the time has arrived when we will have to do some adapting ourselves. □

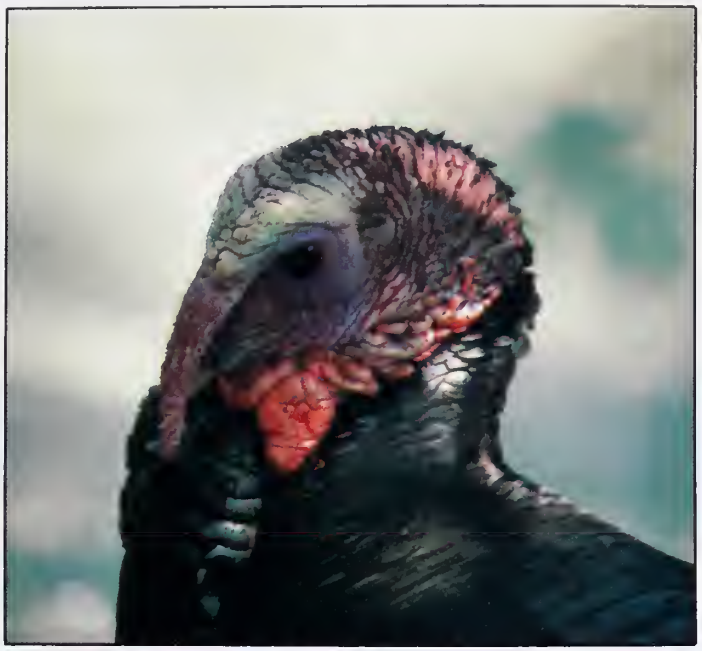
Game Division

Division Accomplishments: Insuring the Future

Bob Duncan, Field Coordinator
Game Division

The Division of Game, with 65 full-time and approximately 50 seasonal part-time employees, is the second largest division of the Game Commission. This division is comprised of wildlife biologists, wildlife management area supervisors, biologist aides, administrative and clerical personnel and a forester. Their mission is to manage Virginia's wildlife resources to assure optimum populations of migratory and non-migratory wildlife, game species and non-game species, for the benefit of Virginia's citizens. Funding for this goal is derived from the sale of hunting, fishing and trapping licenses. Federal aid funds (Pittman-Robertson), based on an 11-percent excise tax on firearms and ammunition, provide supplementary income for the Commission's wildlife program.

The game division conducts research, manages statewide habitat, and develops annual hunting regulation proposals which are recommended to the 10-member Commission for adoption.



Jim Holbrook

Two species which have benefitted from game management efforts in Virginia are the wild turkey and the peregrine falcon.

Hassell Taylor

Bob Duncan

WILDLIFE RESEARCH AND SURVEYS

To successfully manage Virginia's renewable wildlife resources, sound biological data on wildlife populations and their requirements are necessary. During the past year, 31 research projects were conducted to provide information on most game and several non-game species. Major groups of wildlife studied included migratory birds, furbearers, small game, upland game birds, big game and endangered species. The results of these activities provide the basis for specific management practices conducted on Commission-managed lands, and the formulation of annual hunting regulation proposals. They also help biologists deal with problems of wildlife diseases, parasites, crop depredations and minimizing environmental impacts of various projects on wildlife.

LAND MANAGEMENT

Wildlife habitat development and maintenance activities, designed to improve quality and diversity were conducted on 2,294,133 acres located on 54 wildlife management areas. These acres included 25 Commission owned units (175,797 acres) and 24 cooperatively managed areas (1,693,388 acres of Jefferson and George Washington National Forests and 424,948 acres of military bases, state parks and state forests).

Management activities ranged from retarding plant succession by mowing, burning and disking to accelerating succession through seeding, liming and fertilizing. Timber management is one of the most efficient and effective methods of wildlife habitat management. Last year 614 acres of Commission owned timber were thinned or harvested. Reforestation and the planting of wildlife food and cover trees and shrubs was accomplished with about 60,000 seedlings planted and 40 waterholes or ponds constructed for wildlife.

Most of the efforts to re-establish deer and turkey statewide have been completed, but the division of game is continuing restoration activities in some areas including work with additional species. Thirty-five wild turkeys were trapped and relocated and 19 peregrine falcons were successfully released into the wild. Also, Virginia is providing osprey young for use by other wildlife resource agencies in programs to restore that species in other states.

In addition to habitat improvements, maintenance work was done on 252 buildings and public use structures, including parking lots and bridges. Also, to provide for public access, 577 miles of roads and 135 miles of boundary were maintained. To provide additional hunter access, the division maintains cooperative agreements with several private forestry corporations.

GAME REGULATIONS AND HARVEST

Each year, the game division is responsible for formulating and recommending hunting season regulation proposals. Recommendations from the division's staff are based on current research and survey data and are designed to permit the sportsmen of Virginia to harvest the allowable surplus of game birds and mammals without harming the resource. As a result of the protection and management of Virginia's wildlife resources, we estimate that sportsmen enjoyed more than seven million man-days of upland game hunting and approximately one-half million of waterfowl hunting last year. Record harvests were obtained on deer (75,197) and turkey (15,642).

In addition to the recreational opportunities afforded the consumptive users of wildlife (hunters and trappers), approximately 80 million man-days of recreation were provided to wildlife-related non-consumptive activities including bird watching, wildlife photography and nature study.

OTHER SERVICES

Another program objective of the game division is to provide for the expansion of wildlife management lands and facilities to meet the needs of Virginia's sportsmen. To this end, the game division staff coordinates acquisition and facilities planning with the lands and engineering division. During the past year, 2,680 acres were acquired for additional wildlife management lands.

Throughout the course of the year, game division employees conduct a variety of other wildlife related activities including providing technical assistance, coordinating efforts with other agencies (especially the U.S. Forest Service), law enforcement, fish stocking and presenting public programs.

All of these activities are a part of professional wildlife management, the goal of which is helping insure the future of Virginia's renewable wildlife resources. □

Furbearer Research: Sniffing Out the Numbers

Harold Trumbo, Supervising Game Biologist
Game Division

The fur trade in this country is as old as Virginia herself. The taking of animals for their fur, or pelts, began here in the Old Dominion and spread across the nation. The fur trade was an important issue in several wars and was a significant factor in the establishment of many settlements at strategic locations. With the rapid growth of our country, many changes took place that had a great impact on fur-bearing animals and the fur trade. In addition to the over-harvest of animals in the absence of regulations, forests were cut, towns and cities were established and many other land-use practices affected these animals and the trappers that depended upon them for their livelihood. Animal populations were greatly reduced, and in some cases, completely eliminated in various sections of the country.

However, in due time, other changes took place as well. The demand for fur dropped dramatically and the need for protective regulations recognized. State and federal organizations were established and granted the authority to manage these and other natural resources. Such regulation varied from prohibiting the taking of certain birds and mammals, to establishing certain periods for taking, to a limit on the number each person would be allowed, and the means or methods by which they could be taken.

In the years following the establishment of trapping and hunting seasons, people also realized that information was necessary to determine what animals were being harvested and in what numbers. Thus, a fur buyers' report was initiated requiring all fur buyers to submit an annual report showing the total number of furs or pelts they bought and sold.

In 1965, this was taken a step further, when a regulation was passed requiring that all beaver be tagged by game wardens before they could be sold. This same regulation was extended to otter in 1972 and bobcats in 1977. The tagging gave wildlife experts important information on certain animals. These particular species were of great concern because of the increasingly high prices paid for the pelts and because their ranges are more limited than those of many other types of furbearers. In conjunction with these specific activities, other data were being collected that included hunter and trapper surveys and trapper licenses sales reports. These were primarily designed to determine the annual harvest as was the tagging of animals. In order to gain more insight into the population status of Virginia's furbearers, the Commission initiated various projects to help determine population trends.

A state-wide study monitors trends of land furbearers. This consists of establishing permanent routes or transect lines in selected areas, primarily on Commission-owned lands and state and national forests. Game biologists set up scent stations at two-tenths-mile intervals along these routes and place an attractant in the center of each station to attract various animals. Wildlife management area supervisors sample approximately 3500 stations two consecutive days each October by counting the tracks of animals that visit these stations. The data are recorded on computer forms and sent to VPI & SU for evaluation.

Michael Gadomski

Now the game division is trying to use this technique to determine the abundance of aquatic furbearers. Streams and bridges are randomly selected in certain counties and scent stations are placed within 30 feet of selected bridges. The scent station design is used as in the land furbearer project. This is the second year for this study and further evaluation is necessary. A state-wide survey concerning aquatic furbearers was also conducted in 1980. Technical personnel contacted county wardens, trappers and other knowledgeable persons throughout the state. The data were mapped by color-coding streams and marshes according to the reported abundance of each species in question: high, medium, low or none.

Graduate students at Virginia Tech conducted two studies to evaluate and monitor the status of bobcat and otter populations. They obtained carcasses from cooperating trappers and fur dealers. Data collected from these carcasses consisted of breeding age, litter size and an estimate of reproductive history. Tissue samples were preserved for additional studies and life tables were constructed. In the otter study, the researchers will try to determine the levels of PCB's, Kepone, lead and cadmium present in the animals. Mink have been added to this study.

Several of the furbearers are included in the Wildlife Disease Inventory, a study to monitor the exposure of some wildlife species to various diseases.

Furbearers are an important part of the wildlife world and are given consideration equal to that of other game and non-game birds and mammals. Regulations to establish hunting and trapping seasons are based on primeness of pelts and breeding seasons. All current projects are designed to obtain greater insight into population distribution and densities and to help determine to what extent this valuable renewable resource can be harvested. From all indications, Virginia's furbearer populations are in good shape in terms of numbers, and with continuous monitoring, all data collected will be evaluated annually to assist in making season recommendations to the Commissioners for consideration. □

Aerial Photography: Taking Stock of What We Have

Dennis Martin, Research Biologist
Game Division

Photography continues to be a valuable tool in both management and research among wildlife professionals. It is used to record the condition of management practices such as timber harvesting, road and building construction and progress in planted stock. It is an indispensible portion of this and other wildlife magazines, greatly expanding the impact, scope and aesthetics of an article. Countless educational slide presentations entertain and inform interested laymen and professionals.

The technological advances made in photography in the last two or three decades have allowed researchers in many fields including medicine, space and wildlife land management to increase the data base substantially, thus allowing decision makers such as wildlife biologists and administrators to do a better job. One particular research study involving a special kind of photography promises to be a very meaningful tool in the future management of our valuable and varied wildlife resource in Virginia.

The dynamic properties—movements and ranges—add a rather unique dimension to studying wildlife populations, and a great deal of time and resources has and continues to be spent trying to improve inventory techniques. Logic and good wildlife management practices often require knowledge of the status of these populations before making decisions about their management. Check stations were begun in 1947 to provide a systematic sampling system to obtain this required knowledge. The success of both deer and turkey resources attests to the system's value.

Inventorying techniques have long been investigated and refined. Much of the wildlife staff of the Game Commission has thought improvements should be made in inventorying Commission-owned lands as a first step toward improving the overall management practices and programs, thus allowing us to calculate the potential yield of the land as a producer of wildlife. Wildlife is a product of the land; therefore, a long-term research project, designed primarily by supervising biologists Joe Coggin and Harold Trumbo, uses photography as one sampling method to inventory Game Commission lands. The project uses Pittman-Robertson funds and hunting license revenues.

The project has been designed to use aerial photographs to map lands, identifying the numerous cover types, drainages and improvements. This tool is not new, of course: foresters, soil conservationists and other land managers, including biologists, have used aerial photographs to map and monitor changes for many years. However, the photography that was available through the Soil Conservation Service, Virginia Department of Highways and other federal, state and private organiza-

Dennis Martin

(Above) The Game Commission's Cessna T-41-B, used in the aerial photography study; (right) aerial infrared photo of Gathright Wildlife Management Area; (far right) Martin using the camera system developed for the inventory.

Dennis Martin

tions is often too old, taken at an inappropriate scale or the wrong time of year, did not cover the entire management area, or was unavailable to biologists. Professionally flown photographic series have been obtained by Commission foresters when other sources were unavailable.

Frequent, economical, aerial photography has been a dream of land managers for a long time. Space age technology such as minature electronics and refined camera optics and films, combined with much interest in remote sensing, has prompted men such as Dr. Merle P. Meyer of the University of Minnesota and Dr. Roy A. Mead of Virginia Tech to investigate economical methods of obtaining and using small-format photography in both research and practical management. Many graduate students working with these and other investigators have refined systems of using 35mm cameras and light aircraft to make aerial photography available to many more land managers. The Commisson has recently cooperated with Virigina Tech in using the system to study marsh habitats on the Rappahannock River by graduate student Greg Weaver. (See July 1980 issue, *Virginia Wildlife*.) The portion of the habitat inventory study discussed here is a modified spin-off of all this previous work.

The desired results and early testing have dictated the modifying of previously designed systems. The most expedient design involved a "clamp-on" camera mount successfully used in the Midwest, in Virginia and other states. We constructed a similar mount, but when shooting vertical photography using normal or wide-angle lenses, a portion of the fuselage obscured part of the ground in each slide. Furthermore, at 8,000 feet, flying at 100 miles per hour, the chill factor often exceeded minus 80°F. The low temperature hampered the function of the camera shutter and batteries, as well as the body functions of the biologist and pilot.

The next approach involved constructing an aluminum-and-plexiglas window "bubble," but the wide-angle restriction persisted, and the Federal Aviation Administration and insurance regulations created more problems with the system, although flight tests were successful. This system has been replaced with a more flexible one without adding many new, unacceptable problems.

An inspection plate was installed in the bottom of the airplane allowing practically unrestricted utilization of the 20mm wide angle lens, and the cabin can be kept warm enough to allow both the camera equipment and the crew to function adequately. This was practical because of Commission ownership of the particular aircraft.

Through the efforts of the Commission pilot and others, a surplus military Cessna T-41-B airplane (similar to the 172) was purchased several years ago. A new engine, and communication and navigation equipment have created a craft ideal for the project and other research

Francis N. Satterlee

and management surveys. An internal communications system has greatly improved photographer-pilot coordination because of high cabin noise in small planes. With the photographic port in the underside, sharp, unobscured photography has been relatively easy to obtain.

The hunter and the fisherman have provided the Commission funds needed to purchase about 170,000 acres of land. The major wildlife management areas (W.M.A.) range in size from the 268-acre Weston W.M.A. in Fauquier County to the 25,477-acre Clinch Mountain W.M.A. in Smythe County and the Goshen-Little North Mountain W.M.A. complex in Augusta and Rockbridge Counties covering 33,666 acres. These large units require several photographs to provide complete coverage of the areas—the Goshen-Little North Mountain W.M. A. will probably require 500-600 to complete the unit. It is obvious that the camera equipment would need to have capabilities for film that a modest 35mm camera does not provide.

After considerable research, the camera system chosen allows us to take 250 pictures without changing film, advanced with a motor drive attached to the camera, and triggered by an electrically powered *intervalometer*—a timer that sends an electric triggering impulse at pre-set intervals of one to 15 seconds, thus taking the picture and advancing the film automatically. Special filters, extra film cassettes, a plexiglas mount, plus spare batteries, film and maps complete the equipment required.

Several altitudes have been flown on early tests of the system to allow us to determine the desired scale, film and exposure. We are now flying most areas at 5,200 feet above the ground surface at 100 miles per hour.

Color infrared film, sensitive through extended portions of the light spectrum beyond red that humans cannot see, has proven advantageous. Different vegetation covers often reflect light differently, especially in the infrared range, permitting the viewer of the photography to more easily differentiate stands of timber, shrubs and grass cover. Coniferous species seem to be easily identified in the infrared slides we have taken so far. Haze is not as much a problem with infrared as it can be with conventional films.

Mapping begins after slides of an area have been developed by projecting them through a conventional projector to a ground glass screen. Stands of timber and other physical features such as rivers, streams and ponds, roads, clearings and buildings are traced on polyester drafting films. The coded map will then be digitized for computer manipulation at Virginia Tech. The mapping is in its early stages at this writing; look for an article in a future issue of *Virginia Wildlife*.

Approximately 110,000 acres were photographed during summer 1981. The remaining units well be flown after the leaves come out this spring. Between now and then, biologists will be doing a great deal of mapping and field checking. □

Francis N Satterlee

Dennis Martin

(Left) The view from the underside of the plane, looking up towards the lens as Martin looks down through the viewfinder; (above) Martin traces an infrared photo to plot a map of the area's vegetation.

Wildlife Disease Management: The Blood Studies

W. Alan Guthrie, District Game Biologist
Game Division

Wildlife management is a young science when compared with others such as chemistry, math or physics, so we are constantly searching for answers to management questions.

Significant population changes in various game species, suspected animal diseases, and unexplained animal die-offs have prompted biologists to investigate blood diseases as one possible cause for these changes or situations. For example, diseases such as tularemia in rabbits were strong suspects in drastic population changes in certain areas of the state. Research biologists felt that an investigation was warranted. The results of this study prompted field personnel to expand it to include other species, including deer, turkeys, grouse, quail, foxes and raccoons.

Simply stated, the study involves live-capturing a bird or mammal and taking blood samples; later, laboratory technicians process the blood and thoroughly examine it for parasites and disease organisms.

Investigators collect blood samples from the various species, and while still in the field, they prepare microscopic blood slides which are carefully labeled. These slides will be examined later for blood parasites. Another small sample of blood is secured to be processed later in the laboratory with a centrifuge to provide blood serum. This will also be examined for a number of diseases.

The process is a time-consuming one, involving many people, but all the effort is worthwhile because the study has great potential for helping solve certain disease management problems.

Some rather interesting findings have resulted from this statewide study. No definite blood parasites have been found or identified, although researchers have observed several suspicious-looking foreign bodies. These blood slides have been carefully set aside to have professional parasitologists check them further. Some blood parasites we might expect to find are trypanosomes, plasmodium, haemoproteus, leucocytozoans, piroplasmodia, and babesia. These parasites can cause a variety of illnesses, too numerous to elaborate upon here. Malaria and Texas fever are just two examples of diseases that might result.

However, laboratory examination of the processed blood has revealed that blood diseases do exist, which we could not prove prior to initiation of this study. Leptospirosis exposure was noted in some deer and in raccoons. All the readings were from three biologists' districts; subsequent examinations may reveal similar conditions in other areas of the state. There were no other significant readings made except possible exposure to Rocky Mountain spotted fever on a raccoon sample.

A number of samples were examined for bluetongue and epizootic hemorrhagic disease. Very little virus activity was detected; only a doe deer from False Cape indicated a previous bluetongue infection.

Future sampling and examination may reveal additional diseases, but at this point, it appears that we do not have any serious problems. Should future examinations reveal the presence of some diseases, we hope that, as result of this study, we would be close enough to the situation to act promptly and take any necessary measures to curtail, control or eliminate the problem.

The blood disease study is just one example of ongoing research being conducted by management and research personnel to better manage our wildlife resources. □

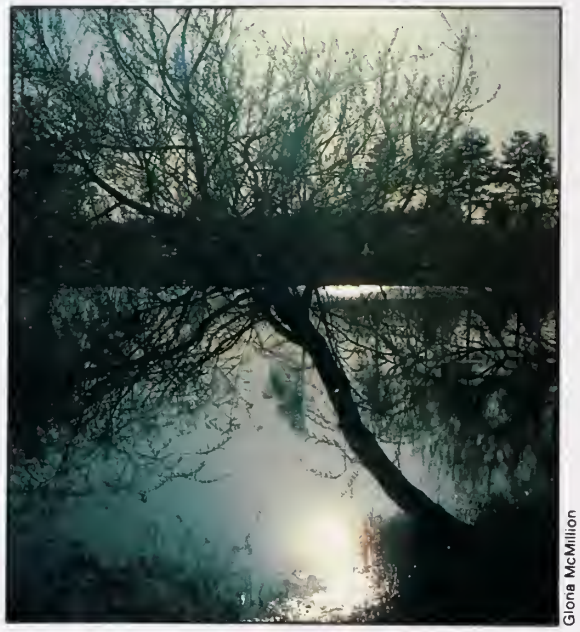
Spike Knuth

Gary Gaston

(Left) Biologists collect a sample from a wood duck in a separate blood study; (above) rabbits were the first species to be examined in what has become a wide-ranging study of wildlife diseases and parasites.

Planning and Development: The Future Outlook

Jack Raybourne, Chief
Game Division



Giona McMillion

Despite obstacles, the future looks bright for Virginia's wildlife.

Wildlife management has been defined as the art and science of making land and water produce a sustained crop of wildlife for recreational purposes.

The game division of the Commission of Game and Inland Fisheries is charged with this responsibility, with primary emphasis on upland and wetland management. It is not a simple task. Virginia contains approximately 25.5 million acres of land stretching from coastal wetlands through Piedmont forests to rugged western mountains. Such habitat diversity provides a rich wildlife heritage for Virginia's sportsmen and women along with a host of other outdoor recreation enthusiasts.

The game division's primary responsibility is to plan, develop and adjust management techniques which serve to balance upland game, big game, waterfowl and non-game wildlife populations within available habitat. Another article in this issue, which summarizes game division accomplishments during the previous year, hints at the magnitude of such a task. Yet the game division exercises direct influence on only 10 percent of Virginia's acreage! Only 176,000 acres are owned directly by sportsmen through Game Commission purchase. The balance of cooperatively-managed lands is owned by national and state forests, state parks, military areas and certain private timber companies. Other vast areas of public lands such as national parks are not available for cooperative wildlife management; however, many are open to public use.

Fully 80 percent of Virginia's wildlife habitat is in private ownership, largely in family-owned farms. Our only means of positively influencing wildlife values on these lands is through an aggressive education program designed to show landowners how they can produce wildlife on their property at little or no cash expense. Current trends in land costs, combined with high interest rates on borrowed money for purchasing farm equipment and agricultural supplies, force most farmers to maximize production on all available acreage. Tens of thousands of acres of productive wildlife habitat will be lost if present trends in farmland management cannot be influenced.

Most state fish and wildlife agencies were formed to increase the numbers of wildlife. With the essential support of sportsmen and other conservation groups, most state wildlife populations prospered under professional wildlife management and enforcement. Deer populations in many states, for example, have exploded and many agencies find themselves struggling to control deer numbers. When Virginia began mandatory checking stations for deer in 1947, the statewide legal deer harvest was 4,011. The 1980 legal harvest was a whopping 75,197 with some individual counties providing harvests approaching the 1947 total statewide harvest. Thousands of deer are lost each year under crop damage permits, auto collisions and disease die-offs. Much of the Game Commission's future efforts will be devoted to educating sportsmen that they must harvest the doe deer that they had so long protected. The future will require continued research, careful data analysis and sportsmen support for regulations designed to maintain the delicate balance of animals and habitat.

A new problem known as "bureaucracy" has emerged in recent years. Future wildlife management efforts may be doomed to drown in a sea of red tape or plummet from a mountain of paper! It is ironic that the well-intended efforts of concerned environmentalists now tie the hands of wildlife managers to provide for the needs of wildlife. Much of the professional wildlife manager's time is now devoted to providing scores of environmental assessments and environmental input reports. Identical documents are required of agencies desiring to purchase and manage lands to *protect* wildlife values as are required of those interests which would have *destroyed* the wildlife values! Strange, isn't it?

A bright note on the horizon is an opportunity to devote needed attention to another segment of the wildlife community whose interests have not been specifically funded until recently. The 1980 General Assembly passed a law providing a source of funds for managing the Commonwealth's many non-game wildlife creatures. Many of these non-game wildlife species have benefitted indirectly from game management efforts as many of the same techniques benefit both types of wildlife. But now these species will receive attention in their own right.

While there are some clouds on the horizon, the future outlook for Virginia's wildlife resources remains bright. There will continue to be obstacles to overcome, but they will be offset by existing new programs and challenges. You may be assured that the game division will remain dedicated to its many outdoor enthusiasts and to the generations of Virginians to follow. □

Non-Game Program

The Tax Check-Off: Your Chance to Help

Sarah Bartenstein, Editorial Assistant
Education Division

January is tax-time for most of us. Wage and tax statements, state income tax forms and federal forms appear in our mailboxes as unpleasant little reminders that, sometime in the next three months, we have to sit down with calculator, pencil, eraser and aspirin and figure out how much we owe. Or, happily, how much is owed us.

task a bit more pleasant. You can give wildlife—and yourself—a tax break. If you have a refund coming, you may designate any portion (in whole dollar amounts) of it—or all of it—to go to a fund to support the management of non-game wildlife in Virginia. If you do not have a refund coming, you may donate to the program by sending a check directly to: Non-game Fund, Virginia Game Commission, P.O. Box 11104, Richmond, Virginia 23230-1104.

In either case, you'll get a receipt for your donation which you can claim on next year's federal and state tax returns. You can't miss!

What is non-game wildlife? The designation "non-game" is for those species which are neither hunted, trapped, nor fished. It includes threatened and endangered species such as the bald eagle and peregrine falcon, but it goes even further than that. A partial list on this page will give you an idea of the scope of the species that will be helped by the non-game wildlife fund.

Why is it important that Virginians contribute to the non-game wildlife fund? For many years, the Game Commission has managed game species with money from license fees and taxes on guns, ammunition and fishing tackle.

In other words, up to this point, sportsmen have paid the bill for wildlife management—game and non-game. Because it is virtually impossible to separate game species from non-game species when it comes to management, the Game Commission has always conducted some non-game wildlife management. But we want to do more, and we need your help.

Until now, threatened and endangered species research has been paid for in large part by federal funds. The federal budget has been cut, however, and these funds have been eliminated. Now it is up to the individual states to pick up the tab.

How will your donation to non-game wildlife management be spent? Depending upon how much money we receive, we hope to initiate the following projects:

- An inventory of the non-game species in Virginia. This is the most basic tool to management of non-game species, but it is something we don't yet have. A computer would store information such as the statewide distribution of all wildlife, habitat requirements, population numbers, and so forth. Before biologists can do anything for non-game wildlife, they have to know what's "out there."
- Interpretive nature trails. "Interpretive" will mean anything from self-guided tours of natural areas with the help of maps and brochures, to trails marked

(Below) Game research biologist Hassell Taylor holds a Delmarva fox squirrel, an endangered species. The Delmarva fox squirrel is one of the non-game species which is already benefitting from Commission programs. Now that federal funds for such work are no longer available, the states must pick up the tab to keep it going. The non-game "tax check-off" is Virginia's answer.

Bob Duncan

Some Examples of Non-game Wildlife

Peregrine Falcon	Eastern Box Turtle
Eastern Bluebird	Least Tern
Bald Eagle	Pine Woods Treefrog
Northern Flying Squirrel	Screech Owl
Yonahlossee Salamander	Purple Martin
Saw-Whet Owl	Eastern Chipmunk
Indiana Bat	Red-Cockaded Woodpecker
Raven	Yellow-Billed Cuckoo
Delmarva Fox Squirrel	Little Blue Heron
Eastern Hognose Snake	Eastern Kingsnake
Osprey	Bewick's Wren
Pygmy Shrew	Evening Grosbeak
Cardinal	American Kestrel

(Below) Three examples of non-game species that will profit from the tax check-off: the slimey salamander, the kestrel, and the great blue heron. This is the first opportunity that many citizens in Virginia have had to contribute directly to wildlife management.

Gary Gaston

Steve Freligh

Alice D. Hatch

signs bearing directions and information on points of interest, to Game Commission staff members who are trained and available to lead tours.

- Raptor rehabilitation. If you found an injured hawk or falcon, where would you take it for care? At this point, chances are you would have no idea what to do with it. With non-game funds, a system for caring for these raptors can be established.
- Literature and technical assistance in the "more wildlife-on-your-property" vein. For example, urban planners and developers and urban dwellers who want to attract wildlife to their yards could learn what to plant and how.
- The reintroduction or translocation of species in appropriate areas of the state where they have been absent. This could have obvious educational and aesthetic benefits. One example of a project already underway is the reintroduction of the peregrine falcon. Virginia soon expects to have its first pair of nesting peregrines since the 1930's. An example of a project that the Game Commission plans to undertake involves the endangered Delmarva fox squirrel. A populaton of some 200 now exists on the Chincoteague National Wildlife Refuge. If that population were threatened for any reason—by disease, for instance—the Delmarva fox squirrel would disappear from Virginia. But the Game Commission is currently relocating some of the squirrels on another part of the Eastern Shore. If successful we won't have "all our eggs in one basket."
- Using wildlife as environmental barometers. The presence of certain species in a given area is indicative of environmental quality.
- Feature films and television productions on non-game wildlife. Educating the public about the problems faced by threatened, endangered and other non-game species is the first step toward getting everyone to help. Equipment and personnel are the prime requirements in getting the word out on wildlife.
- Stepped-up production of publications and more emphasis in *Virginia Wildlife* on non-game and what people can do to help wildlife in their own back yards and across the state.
- Leasing, buying, and entering into cooperative agreements for lands which provide critical or key habitats for certain species. Some species have specific habitat requirements, like the Indiana bat which requires not only a cave, but a certain kind of a limestone cave.

This is only a handful of the examples of how your money will likely be spent. What Game Commission biologists are striving for is an integrated approach to wildlife management. Bob Duncan, field coordinator for the Commission's game division, calls it the "ecosystem approach," and asks, "How can we know the importance of a species down the road?" It's time for all of us—hunters, fishermen, and "non-consumptive" wildlife lovers—to work together for the conservation of *all* wildlife. □

Lands & Engineering

The Newest Division: Lands and Engineering

Larry Hart, Chief
Lands and Engineering Division

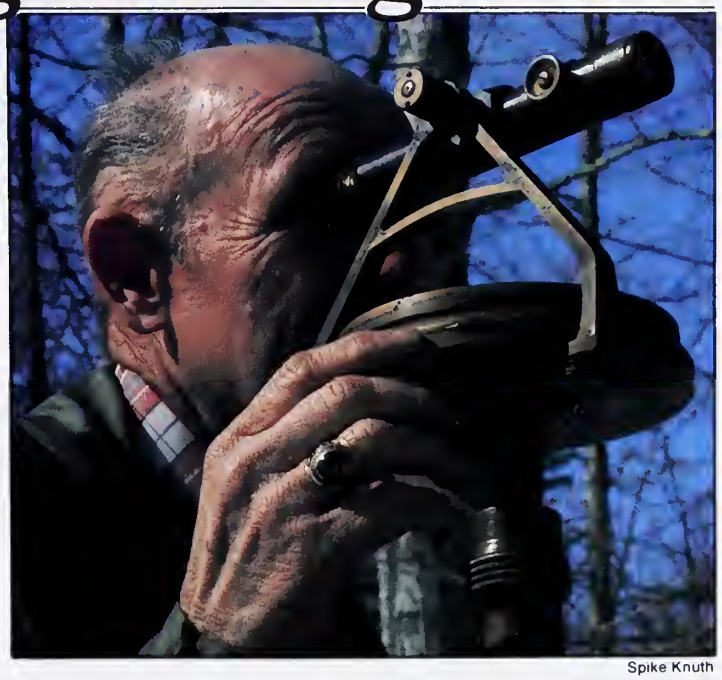
The lands and engineering division was not featured in the August 1976 issue of *Virginia Wildlife*, the last issue to give an in-depth look at the Game Commission—because there *wasn't* a lands and engineering division then. The newest division of the Game Commission, it was formed in 1977 by combining the lands section (formerly under the game division)and the engineering section (formerly under the fish division). The common bond between the two sections was that both primarily used capital outlay funds to perform their functions, and had to comply with ever-increasing regulations to secure funding and execute projects.

The capital outlay program for land acquisition and development projects became so complex that a whole new division was required just to keep up with the process and the paperwork: permits, directives, forms and more permits, directives and forms. We fully anticipate a permit will someday be required to obtain permits.

These might be considered the "thorns in our flesh," but we must endure them to do our job. What is that job?

Our responsibilities can be divided into three major categories. We are responsible for the boating access program, capital outlay programs for land acquisition and/or development, and boundary and topographic surveying. We build boat ramps, build houses, buy land, give and obtain leases and easements, renovate dams, build piers, renovate buildings, survey boundaries, resolve boundary disputes, prepare construction plans and specifications, mow grass, and at least 101 other things. At any given time, we maintain about 80 projects in some stage of investigation, planning, or execution.

The lands and engineering division is 12 people strong. The lands section is based in Staunton and consists of a land coordinator in charge of lands, a secretary, a survey supervisor, and a survey transitman. The engineering section is based in the Richmond office with a field crew in South Hill. The Richmond staff consists of a land coordinator in charge of engineering, an engineer, a survey supervisor and a survey transitman. The field crew consists of a carpenter foreman and a carpenter assistant. And that leaves me, the division chief, and one of the most important people in any organization, our secretary. □



Spike Knuth

Elmer Snyder, survey supervisor for the lands and engineering division, uses a transit that some might call antique. Snyder owns several pieces of older-model surveying equipment, and these tools have often proven useful in deciphering the rather obscure measurements and instructions that previous generations have left for modern field parties.

A Month With the Lands Section

James T. O'Hare, Land Coordinator, Lands Section
Lands and Engineering Division

Members of the lands section spent the last day of August the same way that they spend the last day of every month: reviewing their accomplishments for the past month and making plans for the next.

The first project that land surveyors Elmer Snyder and Douglas Hall discussed with me was a recently completed job that had been in the works for four years and resulted in the recording of eight deeds in Nelson County. The project, which adjoined Nelson County Lake, involved boundary line problems, easement rights, and jointly-used roads. With the considerable perserverance and understanding of all of the landowners involved, (including the Game Commission), land was traded and transferred, and easements given and traded. Finally, after four years, 64 pages of correspondence, 50 pages of survey computations, five Deeds of Gift, one Deed of Exchange, and two Deeds of Easement, everyone seems satisfied with the results. Legal correspondence was reviewed by the attorney general's office, the chiefs of the fish division and the lands and engineering division, and by each of the landowners involved. Few of our projects are as complex as this one, but all projects must be reviewed and approved by more people and agencies than you might have known existed.

Also among Doug Hall's projects for the month are the Carroll land exchange and easement in Roanoke County and courthouse deed research on one tract of land adjoining Lake Robertson. He and Elmer Snyder together surveyed lines adjoining the Highland and Weston Wildlife Management Areas.

All field work was followed by drawing plats or maps to be filled with field notes and deeds for future reference. Since field work is limited in October, November, December due to probable interference with hunters, scheduling is very important to the surveyors and the land coordinator at this time of year.

After the surveyors completed their review of accomplishments, the land coordinator reviewed the progress of 15 active projects in various stages. The need for plats and maps is projected three to four months ahead as each project is initiated by the lands section.

The land coordinator has land appraisals done, initiates title searches, has deeds drawn up, and has plats attached to each deed. Naturally, money must be appropriated to buy any parcel of land, and the money may come from funds appropriated by the U.S. Fish and Wildlife Service, the Commission of Outdoor Recreation or Game Commission funds. Unlike normal real estate transactions, the Game Commission's lands section has at least 28 steps to take in every land transaction, and each step must be executed precisely and in order. These steps are part of the checks-and-balances system required of every state agency involved in land transactions. The job of maintaining and improving land holdings is perpetual, especially since there are some 1,300 or more miles of boundary lines around 411 tracts of the Game Commission's land. □

The View Through a Transit: A Surveyor's Observations

Elmer Snyder, Survey Supervisor
Lands and Engineering Division

The American Indians did not have boundary lines, surveys, and property laws as we know them today. Some tribes would lay claim to certain general areas; other areas were known as hunting grounds.

Before the Revolutionary War, English common law provided the basis for real estate laws in the colonies. The King of England would make grants for land in America. Many of these grants were for 35-40 thousand acres or more.

After the 13 colonies gained their independence, the states assumed ownership of all land. The state of Virginia was much larger in square miles at that time than it is today. All unallocated land within its borders became state land. The policy in Virginia and most other states was to dispose of its land to encourage settlement and development. This also put more tax dollars into the state treasury to run its government.

Around 1779, Virginia established a Land Office to grant unappropriated land. Upon the payment of a certain fee, a warrant was issued; this permitted the warrantee to locate the land, have it surveyed, and return the survey to the registrar. After this, the Governor would issue a grant or patent. As the years passed and the population increased, most of the larger grants were subdivided into farms or woodland tracts and are now owned by many different land owners. Some of the smaller grants still exist as they were first issued. A small number have never been transferred to another owner by deed, but have come down through the family by inheritance or will.

As we read old deed descriptions and look at old plats, we find many different systems of measurement being used, such as feet, paces, yards, rods, perches and chains. The chain used for measuring distance was invented by Edmund Gunter, an English mathematician, around the year 1600. This device was composed of 100 wire links and was standarized at 66 feet. This failed to check one-eightieth part of a mile as used by Romans (5,000 feet); therefore, he lengthened the Roman mile to 5,280 feet, a figure divisible by his 66-foot chain. The acre, today's measure of land area, was standarized by him as ten square chains. Mr. Gunter also discovered magnetic variation and invented an instrument to make star observations.

It is a challenge for the present-day surveyor to relocate some of the old property corners and lines. Many of the markers have disappeared due to various things, including aging. Many of the old records are not very helpful for relocation purposes. For example, what would you deduce from a 75-year old description like this: a property corner is described as a point in a field where a cow stood. Or how about this: a boundary line is described as beginning at a point in Ellis Mill Road, 27 of one W.H. Curtis' steps in a northerly direction to a point in the road. And in another record, a corner is described as a "prize tree." A prize tree? (A prize tree is where a log was anchored for pressing twisted tobacco).

The work of a surveyor is interesting, but can also cause him to scratch where there are no ticks or chiggers. □

Keeping tabs on Game Commission properties is a big job requiring a great deal of coordination among divisions. These properties include 30 major land units totalling 172,255 acres, 27 lakes totalling 2,534 acres, 137 boat ramps plus sixteen river access points, and seven fish hatcheries. Members of the lands and engineering division (facing page) are deeply involved in this challenging task: (l. to r.) division chief Larry Hart and Nisa Cuffey, Lloyd Bird, Joan Bowers, Mark Wood and Elmer Snyder review plans for a floating fishing pier. (This page) The lands and engineering division is responsible for construction of boat ramps such as

Mel White

this one at Dutch Gap. In this example, a slab of concrete is being set into position with a crane. Other methds include pouring the ramp in place, but the most common method is to pour the ramp on dry land, then push it into the water with a bulldozer.

The Engineering Section: Brainstorming and Research

Jerry Fouse, Land Coordinator, Engineering Section
Lands and Engineering Division

Since 1977, members of the engineering section have kept two things in mind in completing its construction projects and special assignments: innovation and cost-effectiveness. Some examples:

- Houses with "all-weather wood basements" which cost 10 percent of the total cost of the house for double the space, and which save energy when heated or cooled.
- The development of waterproof mylar stencils for painting Randy Carter depth gauges along rivers to aid in determing floatability.
- Working with the Virginia National Guard to construct boat access areas for 25 to 30 percent of the bid price.
- The "Cooperative Agreement" for multiple use signed in 1980 allowing us to review proposed bridge locations with the Highway Department before the design stage, which enables us to include boat access.
- Laying pre-cast concrete panels for boat ramp lanes at 75 percent of the price for poured-in-place ramp lanes.

The engineering section plans, funds, constructs, repairs, and administers the statewide public boat access program, which currently consists of 152 access areas. These areas include boat launching facilities, courtesy piers, access roads, turn-around areas and parking lots. You might wonder how a section of six staff members keeps track of boat access areas scattered throughout Virginia. We rely on game wardens, biologist aides, area managers and the boating public to keep us informed on any repairs or improvements needed. The Game Commission receives a steady stream of requests for new boat lauching facilities. Local governments and parks and recreation departments are continuously discussing possible sites for new boat access areas and ways to improve existing access areas. Problems associated with actually developing an access site are many. Assistance of the local governing body is almost always required. The localities are asked to locate specific sites for investigation, when our engineering section performs an investigation to determine the suitability of the site. Sites must have a minimum of two acres suitable for parking where the access will be used by cartop boats. On tidal water, the site must be larger and at a location where the water at mean low tide is deep enough for launching and motoring by large, trailered pleasure boats. The site must have access by a publicly-maintained road and be owned by a willing seller, or preferably donated to our agency. Property may be donated in fee simple or by long-term lease for development of a boating access area. These standards may seem high, but with limited funding for new construction, it is imperative that the state's boaters get their money's worth.

Construction of the access area is only the first step toward serving th boating public. We hope that 20 or more years of public access will be provided at the site, but many sites are lost. Leases expire which cannot be renewed, siltation renders sites unsuitable for boat launching, and acts of nature sometimes move ramps or destroy them. The flood waters of Hurricane Agnes turned an eight-inch-thick concrete boat ramp, 12 feet wide and 25 feet long, so that it pointed upstream at our Watkins Landing in Powhatan County. The same flood not only destroyed our ramp at Howardsville Landing in Albemarle County, but also washed away the land on which the

Mel White

Land coordinator for the lands section is Jerry Fouse (far right, facing page), here taking notes at one of the Commission's boat landings.

Mel White

landing and parking area laid. The number of boating access areas administered by the engineering section is never constant. Each year, we win some and we lose some.

Maintenance responsibilities vary by site and may range from our having no responsibilities to total responsiblity. Under cooperative agreements, municipalities or counties assume all or part of the maintenance responsibilities at some landings. Several localities view our boating access areas as public recreation sites and take them into their public park programs. In some counties, our sites are the only water-oriented public recreation facilities. Assumption of maintenance responsiblilities by localities is becoming more important to our boating access program as the number of facilities increases. In fiscal year 1978-79, an average of $576 was spent at each of our areas for maintenance. In fiscal year 1979-80, that figure rose to $601, and in 1980-81 the figure was even higher.

Each boating access area has an assigned landing supervisor, usually the county game warden. The landing supervisor is responsible for the appearance and usability of the landing. Where the engineering section is responsible for maintenance, landing supervisors usually contract with local citizens for light repairs, litter removal and mowing. Sometimes the work is performed by a nearby resident, sometimes by a group such as a Boy Scout troop, 4—H Club, or even a group of inmates. The ingenuity and ability of the landing supervisors to obtain local maintenance keeps the boat landing program alive.

Most boating access areas are constructed using federal matching grants. Federal grants usually pay 50 or 75 percent of the construction costs. Occasionally, federal grants are used for major renovation of an access area. Maintenance costs are born by the Game Commission. Maintenance funds and matching state funds for construction are derived from the sale of hunting and fishing licenses and boat registration fees.

Members of the engineering section spend about 40 percent of their time on projects other than boating access. Recent projects undertaken by the section include construction of two residences for wildlife area managers, a concession building, a public fishing pier, two major dam renovations, renovation of the Richmond office building, repair of major flood damage at two fish hatcheries, and administration of the leasing system for electronic communication sites on Game Commission property. The public fishing pier was a pilot project undertaken at Lake Orange to evaluate the benefits of providing such a facility to anglers. If this pier is successful, more piers will be constructed at other public fishing lakes. The dam renovations were a prelude to a very long project required by the U.S. Army Corps of Engineers.

Public Law 92-367, passed in 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a national program of safety inspections for dams throughout the United States. Thirty-four dams were identified on Game Commission property which could come under jurisdiction of the national program. Seven dams have been inspected by the Corps of Engineers and corrective measures to comply with the program completed at one dam. The engineering section performed its own inspections at 27 dams to derive an estimate of repair costs as a result of the National Dam Safety Program. The total estimated cost of repairs in 1979 was $3.2 million. However, the estimated cost of repairs at Rural Retreat Dam before the Corps inspection was $234,000. Actual costs for renovation totaled $429,000. If all dams were underestimated by the same percentage as Rural Retreat Dam, total repair costs would balloon an estimated $5.9 million. The engineering section will be in the dam renovation program for many years.

The engineering section has an abundance of projects to complete in the next several years. Brainstorming and research will be regular activities in our effort to provide the best services and facilities to the sporting public at the lowest possible cost. □

Capital Outlay Program: Creative Financing

Larry Hart, Chief

Economics will have a major impact on the future of the lands and engineering division. If funds get tighter, we will be required to devise new techniques to fund construction of facilities and to pay for land. Already, such techniques as "in-kind match" are being used to stretch the license dollar. This technique involves using a donation by the property seller as all or part of our share to match federal grant funds. This way, the landowner is paid chiefly with federal funds, leaving more state funds for other projects. In fiscal year 1980-81, land acquisition projects were 97 percent federally funded. As federal money gets tighter, we will have to reach deeper into our bag of tricks to continue serving Virginia's sportsmen.

Land acquisition projects may be on a smaller scale and associated with an existing wildlife management area boat ramp or fish hatchery. A few boat access areas may be purchased, but donated land to be used as "in-kind match" toward construction costs will more likely be the norm. At our wildlife management areas, acquisitions would be for inholdings to straigthen boundary lines and improve access. Fish hatchery land acquisitions will probably be for expansion, or to protect or improve the water supply.

Development projects will be more carefully selected, and energy efficient and avenues of funding them will be better evaluated. Boating access areas closer to urban areas will have higher priorities. Smaller access areas for canoes and car-top boats will be in greater demand as boaters leave their larger "gas guzzling" boats and towing vehicles at home. The lands and engineering division will gear its activities toward meeting these changing demands. Launching ramps will be poured on a flatter grade to accomodate the reduced pulling power of smaller vehicles now used to tow trailered boats. Avenues to enhance shoreline and pier fishing opportunities will be examined. Research projects will be initiated to explore methods to reduce construction material costs. The lands and engineering division will continue to provide a quality service to the sportsmen of Virginia . □

Fish Division

The Fish Division: Objectives and Accomplishments

William E. Neal, Field Coordinator
Fish Division

From the beginning, Virginia's freshwater recreational fishermen and women have voluntarily supported the Commission's fishery management, research, and survey programs with their fishing license purchases. In the mid-1950's, after considerable encouragement from these same sportsmen and women, the United States Congress approved an excise tax on certain fishing equipment known as the Federal Sport Fish Restoration Act. Combined total revenues from these two sources amount to some $3.5 million per year, and they make the modern fish division function.

To give you some idea of how the Virginia Game Commission's fish division functions, here are a few numbers: The division is composed of 57 men and women working across the state. Some work in the central office in Richmond, others in one of eight biological districts, and others in one of seven fish hatcheries. The state's freshwater recreational fishery resources are supported by 24 Commission-owned or -leased public fishing lakes which contain a total of 2,347 surface acres; 15 large and 100 small man-made lakes with combined total water areas that exceed 200,000 surface acres; 27,500 miles of warmwater streams; and 2,975 coldwater streams.

Wherever you find members of the fish division, and whatever their tasks, they share the same objective: the

Spike Knuth

Fish division personnel use several methods to collect fish for sampling; one of these is gill netting (above).
Perhaps the best known of the fish division's activities is stocking; biologists, below, lower trout from a truck to a stream.

Spike Knuth

management of Virginia's public freshwater fishery resources to provide the greatest possible recreational benefit without damaging the resource.

What is fish management? It includes environmental and resource planning and development, resource protection, research, survey, and public relations; and on any given day, Virginia fisheries managers may engage in one or all such activities. However, the division's primary mission is, and has always been, to provide the "on-the-ground" management needed to enhance the resource, and exciting things are happening in the area.

A Virginia Trout Stream and Environmental Inventory was completed in 1980, and in 1981 , the inventory results were used to add new dimensions to the trout resource management program. The coldwater hatcheries staff hatched, reared, and stocked about 1,000,000 catchable (9- to 11-inch) trout in the state's designated put-and-take trout streams, its fish-for-fun and fee-fishing areas, and several lakes; but it also hatched, reared, or otherwise handled about 400,000 wild brook, brown, and rainbow trout fingerlings. All were stocked in several carefully selected streams or lakes, such as Laurel Bed Lake, Greasy Creek and the Jackson River. One hundred and fourteen streams have been designated suitable for fingerling introductions, and Virginians can expect many more such stockings in the immediate future.

The Jackson River above Lake Moomaw may eventually highlight the fingerling stocking program. About 25,000 McConaughy strain wild rainbow trout fingerlings were stocked in the Jackson's headwater in the past two years, and another 12,500 fish will be introduced this year. As these fish grow, we believe they will gradually move downstream to take up permanent residence in Lake Moomaw. However, they should consider the Jackson their "ancestral home" and eventually return to it to spawn. If they do, Virginians will have their first totally wild self-perpetuating trophy trout fishery.

The fish division continued working within its overall operational fisheries management plan in 1981. Under this plan, district biologists collect and analyze fish population and fisheries-use data from at least one-third of the state's most heavily used waters each year. The data are used to develop multi-year management plans for the waters sampled. One-third of such waters were examined in 1980 and another third in 1981, and the final third will be studied this year. In the meantime, the unsurveyed waters will be gradually brought into the plan so that by 1986, all of our freshwater fisheries will be systematically managed.

Warmwater fish stockings for population enhancement, maintenance, and/or establishment are an important part of the division's overall management plan. In 1981, the warmwater hatcheries staff hatched, reared, and stocked more than 3.5 million fishes in the state's public waters. Largemouth, smallmouth, spotted, and striped bass, various sunfishes, channel catfish, muskellunge, tiger muskellunge, northern pike, walleye, and striped bass X white bass hybrids were included in the 1981 stocking lists. □

Fish Management: A Definition

John Kauffman, Supervising Fish Biologist
Fish Division

Management of Virginia's freshwater fishery resources is the primary responsibility of the Commission's fish division. The goal of management is to have each lake, stream, or reservoir produce the "best" fishing for fishermen. But "best" means different things to different anglers. Best to some is a few large fish, while to others it may mean a lot of fish. So all waters are not managed in the same way.

Management is more than stocking fish; it is a careful evaluation of the resource and its potential. Before any body of water can be managed, a biologist must first determine what's there. The data collected include a description of the physical, chemical and biological environment. Physical and chemical factors that affect management include temperature, dissolved oxygen, pH, nutrient levels, and amount of cover.

The walleye at right was trap netted at Lake Orange. Biologists generally use trap netting to collect those fish species which move along the shoreline.

Collecting data always involves fish sampling. Fish can be collected by a variety of methods. Trap nets are most effective for fish that move along the shoreline such as trout, bream, and esocids. Gill nets entangle fish and are used to collect striped bass. Electrofishing is used to collect fish commonly found in shallow water, such as bass and bluegills. Fish are attracted to the sample boat by pulsed electric current produced in the boat. Fish are stunned as they approach the boat, netted, placed in a live well, and revived in a few minutes. Electrofishing is used in both lake and stream sampling while nets are used primarily in lake sampling.

Neither netting nor electrofishing allow the biologist to easily determine the pounds of fish present in an area. Spot poisoning or cove rotenone does this. A one- to two-acre area is isolated by a block net extending from above the water surface to the lake or stream bottom. A fish toxicant is applied and all the fish observed are collected. This is the most efficient method of estimating the amount of fish present, particularily for shad and crappie populations.

Spike Knuth

Angler interviews or creel surveys involve questioning fishermen about their catch. Surveys allow the biologist to see if his work has improved the angler's catch. Although effective, it is a costly method of sampling and this limits its use.

Fish collection is only a part of the biological sampling. After collection, fish are weighed, measured, and a scale sample taken. In most cases, the fish are then released in the water. Microscopic examination of the fish scales (like tree rings) allows the biologist to age the fish and determine growth rates.

Data analysis now begins for the biologist. Physical and chemical information is used to determine which fish species will best survive. If needed, species suited for that environment can then be stocked. Fish growth, lengths and weights are compared to similar information collected from other waters.

If the fish are slow-growing, or other problems exist, the fish biologist determines the best method to improve the fishery. A variety of techniques can be used by the biologist to improve the fishing.

Fish stocking is the most visible aspect of fish management. Stocking is done for several reasons. Establishment of good populations of game fish in new or reclaimed waters is the first reason. Secondly, stockings are used to introduce new species not already present. Stocking is also used to strengthen game fish populations when spawning has failed. Fish are also stocked to replace fish lost to a total fish kill resulting from pollution.

Habitat improvement may be conducted when fish shelter is lacking. Shelter or cover provides resting areas as well as increased surface area for fish food protection.

Out-of-balance fish populations are often observed in warmwater lakes. There are several ways for the biologist to restructure the population. The lake may be drained, lowered for part of the year, or be partially poisoned. Additional predator species may be stocked. Fishing regulations may be changed.

Fertilization is conducted at five Commission lakes. Nutrients are essential for fish production, just as they are necessary in the garden. Fertilizers add the nutrients necessary for fish food production, ultimately benefiting the fishery. Fertilizer cost is high, so it is used in lakes which are intensively fished and have a naturally low fertility.

Regulations are an important part of fish management. They are designed to protect the fish population by restricting angler harvest and ultimately, to improve the angler's catch. Regulations must be effective, so they are periodically evaluated to ensure that they do protect and improve the fishery.

Aquatic weeds provide cover but sometimes they may be dense and limit angler access as well as bass predation. If weeds are a problem, the biologist determines the best control method. Chemical control is the most common method used. Biological weed control is now being evaluated at several Commission-owned lakes. If biological control proves to be effective this would result in dollar savings to the license holders. □

The Lake Management Program

James J. McHugh, District Fisheries Biologist
Fish Division

Fishing in small public lakes is a popular pastime among Virginians. A lake outing offers peace, solitude, and good fishing. Many fishermen do not realize that all but two of Virginia's lakes are man-made and that the number of lakes has doubled in the last 20 years. New lakes are being built every year and today few Virginians live more than 25 miles from a public lake. Although all lakes have certain things in common, no two are exactly alike. They vary in size, shape, and water quality. The composition of fish populations is also quite variable between lakes, even between lakes which contain the same species. In addition, fish populations have a natural tendency to change through time. Bass fishing in a particular lake may be good this year, poor next year, and fair the year after.

Managing the fish populations of lakes open to public fishing is the responsibility of the Commission's fish division. The problems and complexities of this task have grown with the construction of each new lake. Therefore, the fish division has initiated a statewide lake management program designed to provide timely management of all public lakes (defined as impoundments smaller than 1,000 acres) while making the most efficient use of staff time and limited financial resources.

In 1979, as the initial phase of this program, an inventory was made of every lake in the state open to public fishing. Information recorded for each lake included location, size, depth, elevation, watershed area, public facilities, primary uses besides recreation, and whatever information was available about the fish population.

The inventory identified 102 lakes with a total surface area of 14,698 acres. They are scattered throughout the state and range in size from three to 800 acres. Sixty of the lakes are smaller than 100 acres and only 16 are larger than 250 acres. Although all of the lakes are open to fishing, recreation is the primary use of only 61 lakes. The remainder were built as water supply, flood control, or hydroelectric impoundments. Forty-seven of the lakes are owned by municipal governments and 26 are owned by the Commission of Game and Inland Fisheries. Rental boats are available at 31 lakes. Thirty-three have picnic areas and 15 have campgrounds. Most of the lakes were subject to some management by fish division biologists during the five years prior to 1979. Seventy-five were sampled and stocked during that period. Stocking included fish of 14 game and forage species.

Following the 1979 inventory, the division decided that it would be most efficient to sample the fish population of each lake every three years (1/3 of the lakes each year). Sampling procedures were standardized so that each lake would be sampled in exactly the same way. This allows information to be compared between lakes and provides the data base needed for an improved understanding of fish population dynamics. Standard reporting procedures were also developed which call for specific management recommendations for each lake and greatly simplify interpretation of the data.

Sampling began in the spring of 1980 and by this fall all 102 lakes will have been sampled once. Each lake is sampled under the supervision of the fish biologist responsible for that area of the state. The biologist is also responsible for summarizing the data, formulating management recommendations, and writing a report for each lake. The reports are then reviewed by the fish management field coordinator and the management recommendations are implemented. After three years, the lake is sampled again and the management recommendations are updated accordingly.

Another aspect of the program is an inventory of all private lakes in the state larger than 10 acres. Emphasis is being placed on identifying lakes not presently open to the public but which have that potential. This should help facilitate a gradual expansion of the public lake system, particularly in those areas of the state where public fishing waters are in short supply.

Virginia's public lakes are among the state's major fishing and recreation resources. With more than 100 public lakes throughout the state, there are several within an hour's drive of almost every Virginian. For more information on public lakes in your area, contact the nearest fish division office or the main office in Richmond (P.O. Box 11104, zip 23230-1104, phone 804/257-1000). □

Spike Knuth

Anglers enjoy the fishing at Lake Airfield.

The Trout Program In Virginia

R.E. Wollitz, Supervising Fish Biologist
Fish Division

Much of Virginia's trout management program is directly related to its three trout hatcheries. Virginia's first hatchery is near Marion in the southwestern portion of the state. Nearly all of the trout stocked in Virginia originate at Marion. This is where the brood stock are kept and eggs are taken and hatched. When trout are large enough to be moved, many are distributed to the rearing stations at Montebello in Nelson County and Coursey Springs in Bath County, where

they grow until they are large enough to be stocked in Virginia's streams and lakes. A small number are reared in three raceways at the Buller warmwater fish cultural station in Smyth County. Rainbow, brook and brown trout are raised at these facilities.

Most of the trout produced at Virginia's hatcheries enter the "put-and-take" program: trout are stocked into streams and lakes where a large portion are expected to be caught. Streams included in this program are selected from Virginia's trout stream classification by district fishery biologists who also allocate numbers of trout for each stream, based on stream quality and fishing pressure. The total number of trout allocated to this program annually is approximately 600,000. Some 76 percent of these are rainbow, 14 percent brook and 9 percent brown trout. Approximately 185 streams and 18 small lakes in 40 western Virginia counties are included in this program. Streams classified as wild trout streams are not generally included in the put-and-take program. Most of these streams are capable of providing a sustained fishery through natural reproduction without being stocked. Also, introductions of rainbow or brown trout into native brook trout streams may result in losing the brook trout fishery through competition, as has happened elsewhere.

Spike Knuth

The fee-fishing program may also be included in the put-and-take program. This segment includes Big Tumbling Creek located on the Clinch Mountain Wildlife Management Area about seven miles west of Saltville in southwest Virginia, the Crooked Creek Fee-Fishing Area about five miles east of Galax, also in the southwest, and Douthat Lake at Douthat State Park, just north of Clifton Forge. In addition to a valid Virginia fishing license, a $1.00 daily permit is required to fish the areas from the opening of trout season through Labor Day. After Labor Day, general trout regulations apply and a trout license is required. This segment of the put-and-take program requires an additional 135,000 trout.

In addition to the 735,000 trout stocked by the Commission's fish division in the put-and-take program, the federal government stocks approximately 267,000 trout in streams and lakes in the national forests.

Another management program which utilizes hatchery trout is the put-grow-and-take program, wherein fingerling and occasionally larger trout are introduced into streams and certain lakes where, after a period of growth in the wild, they are creeled. South Holston and Philpott Reservoirs are big, two-story reservoirs where large fingerlings and larger trout (South Holston) are introduced annually. These fish spend a year or longer in the deep cold waters of the reservoirs and, when caught, are usually in more than 12 inches long. Occasionally, 25-inch, five-pound trout are creeled. A total of 43,000 rainbow trout are allocated to these reservoirs annually.

Brook trout being reared at Montebello Hatchery.

Experimental introductions of rainbow trout from Lake McConaughy, Nebraska are being made in tributaries of Lake Moomaw in Bath County. This strain of rainbow is expected to spend about one year in the tributary streams, then move into Lake Moomaw where it will mature. After they mature, we expect these fish to make spawning runs to the streams where they were released, spawn and return to the lake. We hope that this will result in a self-perpetuating trout population as it has in Lake McConaughy.

Experimental stream introductions of trout ranging from three to six inches are being conducted on an annual basis, also as a segment of the put-grow-and-take program. Normally 100,000-150,000 fingerling trout are introduced annually into suitable streams. Most of the fingerlings used are brown trout, with lesser numbers of rainbow and brook. Suitable streams for this program are obtained from the recently-completed trout stream classification. These streams have all been classified as having trout potential, but are presently devoid of reproducing trout populations. The stream classification lists 114 such streams comprising about 421 miles. So far, this program has been more successful than expected. Most of these streams have provided good or excellent fishing and a few have even developed self-maintaining trout populations, thus materially increasing fishing opportunities which is the overall goal of fish management. To date, approximately 35 streams have been included in this program.

To illustrate the success of the put-and-grow stream introductions, Mossy Creek and Beaver Creek have been included in that group of streams which have special regulations and may be termed "fish-for-fun" or "limited-creel" streams. These streams have been divided into three groups with varying regulations. In addition to the put-and take-program, these streams provide variety to Virginia's trout program. □

The Wild Rainbow Trout in Virginia

Gary Martel, Fish Biologist
Fish Division

When wild trout fishing is mentioned to the average Virginia fisherman small mountainous streams with brightly colored brook trout are usually the image he conjurs up. While the native brookie or mountain trout still occupies a significant portion (67 percent) of the 2,000-plus miles of wild trout water in Virginia, the brook trout's cousin, the rainbow trout, is now firmly established in many western Virginia streams, occupying 20 percent of the wild trout water.

The rainbow trout is not native to any waters of Virginia. Its native range extends through the mountainous western areas of North America. The first rainbow trout planted in Virginia waters were brought here by train from the west and stocked by sportsmen. For about a century, the rainbow trout has been a favored trout to stock in the popular "put-and-take" trout programs throughout the country. In fact, 76 percent of the trout stocked by the Virginia Commission of Game and Inland Fisheries are rainbows. While a large percentage of those stocked were caught by fishermen, some of the smarter (or luckier) managed to avoid the skillet and remained in the streams in which they were stocked. If conditions were favorable, these "holdover trout" spawned and established wild populations.

Wild populations of rainbow trout can now be found scattered throughout the Old Dominion's coldwater streams. One particular area where rainbow trout have found suitable habitat is in the Mount Rogers section of the Jefferson National Forest. Within the counties of Grayson, Smyth, and Washington there are about 200 miles of wild rainbow trout water, much of this on national forest land.

While the brook trout is often found in small streams covered with rhododendron, the rainbow is frequently found in more open water where fishermen can cast a fly or spinner without getting caught in the shrubbery on every second cast. Once hooked, the wild rainbow nearly always takes to the air, jumping in an effort to dislodge the hook from its mouth. The bright crimson on the sides and the acrobatic nature of the wild rainbow distinguish him from other trout in Virginia streams.

Some of the larger wild rainbow streams open to public fishing in the Mount Rogers area are Fox Creek and Big Wilson Creek in Grayson County, Big Laurel Creek and the South Fork of the Holston River in Smyth County, and Green Cove and Whitetop Laurel Creek in Washington County. Sections of both Green Cove and Whitetop Laurel Creek have been designated special regulation areas, requiring single hook artificial lures and the creeling of no trout under nine inches long. (Consult your fishing regulations pamphlet for the specific locations and restrictions.) While most of the wild rainbow trout caught will fall into the five-to-nine-inch class, occasionally larger fish in excess of 20 inches are caught from some of the better streams.

Although opening day crowds and activity don't seem to bother the stocked rainbow trout, any unusual activity

Mitchell Norman

(Above) A wild rainbow trout. Rainbows are not native to Virginia waters, but populations have been successfully introduced here. (Below) Muskies are reared at Buller Hatchery.

Spike Knuth

will cause wild rainbows to head for cover. Flies, spinners, or live bait can all work well when fishing for wild rainbows. So when you feel that most of the stocked trout have been caught from your favorite stream, don't hang up your fishing rod; head back out and try for some of Virginia's wild rainbows! □

The Warm Water Hatchery System

Joe Gray, Fish Cultural Supervisor
Fish Division

Are you a muskie fan, looking for a tiger? Or perhaps you are a bass fisherman, going for largemouth, Roanoke, striped, smallmouth, spotted or hybrid striped bass. If you are after any of these game fish, you should know that they—and many other species—may be the products of the warm water fish hatchery system operated by your fish division. One federally-owned hatchery and four state-owned hatcheries provide over 3.5 million fingerling-size fish each year for Virginia's waters. And our fish hatcheries are of national and international importance, since fish reared in these facilities are shipped to 19 other states and sometimes to other countries. The medium of exchange for many of these trades is striped bass hatched at our Brookneal Hatchery.

Spike Knuth

These raceways at King and Queen Hatchery near Stevensville are home for a short while each year to thousands of northern pike, walleyes and striped bass. The fish are fed pelleted feed until they reach fingerling size at which time they are stocked around the state.

The Brookneal facility hatches and rears striped bass. Some 40 million young bass are hatched each year and many are released in our rearing ponds, but several million are shipped to other states and national hatcheries in "fish trades." Virginia benefits from these exchanges, too: the national hatcheries return about 25 percent of the striped bass fingerlings raised from our fish; Kansas furnishes walleye eggs; Nebraska returns northern pike, walleye and special migratory trout eggs; muskellunge eggs come from Minnesota, Kentucky and Ohio; and occasionally, hybrid muskellunge from Pennsylvania are sent to Virginia. These incoming fish are usually hatched and reared at one of our other three hatcheries.

The Buller Hatchery deals with warm, cool and cold water species. It maintains domestic northern pike and muskie brood stock from which hybrid (tiger muskie) muskellunge are obtained. Muskellunge eggs are obtained from domestic brood stock and are hatched and reared to the fingerling stage. Some of the eggs are transferred to the Front Royal Hatchery for this purpose. The Buller Hatchery also rears northern pike, walleye, spotted bass, Roanoke bass and occasionally striped bass. Approximately 80,000 rainbow trout are raised for stocking fee-fishing areas. Golden shiner and fathead minnows are cultured as muskie food.

The Front Royal Hatchery is a multi-purpose rearing station with emphasis on northern pike, walleye and striped bass fingerlings. Muskellunge eggs collected from wild fish in northern Virginia lakes are hatched and reared to advanced fingerling stage. Northern pike eggs from Nebraska are hatched and reared to fingerlings. Walleye are reared to fingerlings and stocked in northern Virginia waters. Striped bass and northern pike are raised as a second crop when pond space permits.

The King and Queen Hatchery is the most diversified state facility. Several species are hatched and reared there, and its personnel distribute fish from the national hatchery at Harrison Lake. This unit hatches walleye, many of which are transferred to the other hatcheries for rearing to fingerling size, and the unit maintains numerous walleye rearing ponds. King and Queen Hatchery rears walleye, bluegill, redear sunfish, largemouth bass, striped bass, bluegill, blue catfish and northern pike.

The national hatchery at Harrison Lake furnishes all the channel catfish and many of the largemouth bass released in Virginia's public waters. Walleye and striped bass from our hatcheries are reared to fingerling size there and returned to public waters.

The state's warm water hatcheries stock about 3.5 million fingerlings in Virginia waters each year. Fish rearing is a seven-day-a-week, twenty-four-hour-a-day project during the seasons in which they are produced. The next time you are in your bass boat and put a tiger in your tank, or for that matter any of the other fourteen species raised at your warm water hatcheries, think of the work, money, and dedication put into these fish by your warm water hatchery personnel. □

Law Enforcement

The Changing of the Guard: Law Enforcement Accomplishments

John H. McLaughlin, Chief
Law Enforcement Division

Anyone who has watched a formal military guard mount, or the changing of the guard, can readily distinguish between the old and the new guard. The old guard has pulled their 24-hour duty, has kept the area safe and secure and is proud to turn the job over to their relief, but their pride is not quite as evident as that of the new guard. The old shows loss of sleep in their eyes, from having to walk their posts every two hours out of six, while trying to sleep in the guard room of the bustling guardhouse between tours. Their uniforms bear evidence that they slept in them to fulfill their obligation of readiness.

The new guard has just passed a rigid inspection. Each uniform is spic and span. All creases are in the proper places, and weapons have not so much as a grain of sand on them that might inhibit their effectiveness.

The contrast is apparent, yet neither owe any apologies. To the casual observer, the new guard looks sharper and superior, but when viewed from the vantage point of time, one sees that the new guard would not even have a role to perform had the old guard not "kept the faith."

This comparison came to me while reading a newspaper tribute to a retired game warden, typical of the old guard. He is Lyle Alley. He is the perfect prototype of scores of game wardens who "fought a good fight, have finished the course and have kept the faith."

Lyle says, "The biggest difference in being a warden then and now is the walking. In my day, we walked the mountain, but, of course, there weren't many roads then."

The fact is, that there were not many cars then either, and certainly no game warden pursuit vehicles. Some of the old guard never drove a car and a high speed chase, in those days, was foot race through the boondocks, or an unmounted steeplechase across fields, creeks and barbed wire fences in pitch darkness.

The old guard was in on the original deer stocking and literally lived with fledgling herds that were stocked where deer were virtually extinct. Many of them faced a hostile populace, who had never heard of a game or fish law and looked upon a game warden as a turncoat. Just imagine the plight of the first game warden that ever prosectued a native for exceeding the bag limit on squirrels!

The new guard is represented by 103 people who have joined the ranks since 1962 when the statewide competitive selecting program started, plus the 31 unusual people who have the special qualities required to bridge the gap between the two eras and work effectively in each. The changing of the guard did not occur at any *particular* time, but changed over time.

Many contemporary game wardens—who are doing outstanding work—could not have coped with conditions or attitudes, during the heyday of the old guard, any more than those forerunners could have taught a standard eight-hour hunter safety course in a high school classroom under the critical eye of an English teacher.

Spike Knuth

The old guard were the right people for the their time and the new guard is proving their mettle in a new age under different circumstances.

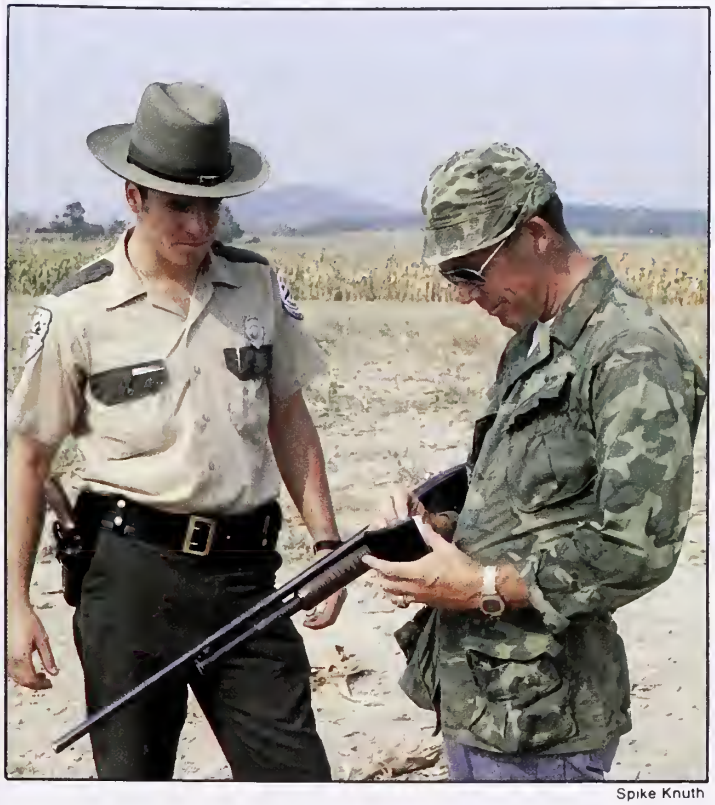
The old guard furnished us with a springboard from which our present people surged ahead of our previous all-time enforcement record. This includes a record year, 1978-79, when our people led the entire nation in the number of arrests per conservation officer and, at the same time, ranked third in the hunter safety program in the all of the United States and Canada.

Last year, in an all-out effort to try to obtain compliance with our conservation laws, your game wardens made a total of 16,439 arrests. This meant 1,155 court cases over the previous record.

This underscores the fact that there are countless infractions of the game, fish and boat laws occuring constantly and a prudent, dedicated game warden will detect a large portion of them even without outside help.

Let's face it, a breach of the conservation laws does not

(Left) Game warden Charlie Chappell, one of the fine people helping to bridge the gap between the "Old Guard" and the "New Guard." (Below) wardens regularly check hunters for proper licenses and permission to hunt, and to make sure that all regulations concerning weapons are being followed.



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exactly affront the public conscience. This was graphically demonstrated by a New Mexico research team which simulated 43 game violations in the presence of at least 43 people, and only one person made an effort to report any of these visible infractions. Do you remember that childhood song: "Somebody did a golden deed, was that somebody you?"

The number of arrests that a game warden makes is certainly not the full measure of the officer. It is, however, a gauge to the individual's efforts, dedication and skill.

The most common infraction was fishing without a license, which totaled 4,544 cases, and hunting on private property without permission ranked second with 1,236 cases. This speaks poorly for many of our people, who freeload and disregard the rights of others. The third most common violation prosecuted was spotlighting deer—1,018 cases. These cases represent the most hard-fought, difficult and dangerous ones of all and represent the dregs of the sporting public.

The most common boat law infraction was failure to have the prescribed life preservers on board: 847 cases. How do you get people to protect themselves?

Those who would accuse us of being man-hunters should make note of the impressive public relations or educational report. In a further effort to encourage people to obey the laws and to help enrich their lives, our officers showed 2,493 conservation movies, gave 1,947 talks, conducted 335 radio programs, appeared on television 12 times, and held other programs in which 346,409 people attended. They also educated nearly 30,000 of our state's youngsters in hunter safety and hunter ethics.

Here's a special salute to the new guard, who have brought nationwide credit to Virginia with their unusual efforts and accomplishments. And here's a hearty toast to those forerunners, who held on when there was very little left but the will that says, "Hold on." □

Recruiting the Virginia Game Warden

Lewis Brandt, Assistant Chief
Law Enforcement Division

Recruitment is a lengthy process of separation—separating the dreamers from the realists. A man who doesn't dream is seldom a great achiever, but a dreamer who never comes down to earth cannot see things as they are. Anyone who sees the job of a game warden as a chance to fish and hunt the good spots and get paid for it is out of touch with reality. The reality is that a game warden must work incredible hours, and that the work of a game warden often goes unnoticed and unappreciated. And game wardens are assaulted and game wardens get shot. Recruitment must successfully locate men and women who dream dreams and are achievers, and who are realistic and mature enough to know that law enforcement takes real commitment.

Recruitment begins each August with a campaign rivaling that of one seeking a vote. Through newspapers, radio, TV, storefronts and the seasoned eyes of our game wardens, we seek out those individuals who would make good officers, and steer them to any local office of the Virginia Employment Commission (VEC) to make application. Since hiring occurs only once a year, applications are taken but once each year, and that between the dog days of August and the last of October.

It is surprising to the general public—but not to someone who has been bitten by the "game warden bug"—that so many people would apply for a job that has status, for the most part, only among those who are "in it." However, several hundred people will catch the scent and will, through wind and snow and in the face of insurmountable odds, find their way to the VEC. In one year, over 850 answered the call. When one understands that only about a dozen will be hired, one realizes in what a competitive arena these jobs are fought for and won.

Before a person may apply, he or she must meet certain standards: the candidate must be 21 years of age by May 1, have at least 20-40 uncorrected vision in each eye, and have a high school diploma or the GED equivalency. Since a game warden must operate a patrol car and carry a weapon, the applicant must be able to obtain an operator's license in Virginia, and must not be prohibited from carrying a firearm.

One last qualification that is difficult for some applicants is the willingness to relocate. The applicant must be willing to be assigned anywhere in Virginia—and we will not send him back to his home county. While this is a hardship for some, it pays dividends to the individual and to the Commission over the long run.

We employ four basic tools in the selection process. A written test is the first hurdle faced by the new applicant. Developed at Virginia Commonwealth University, this test is designed to identify the qualities one should bring to the job. It is pointedly job-related and non-discriminatory in its scope. The next phase of testing is an oral interview between the applicant and a board made up of five people representing the VEC, Virginia Tech and the Game Commission. The board tries to gain some knowledge of the applicant and why he wants to be a game warden. Also at

Stuart Doggett

Stuart Doggett

Stuart Doggett

Stuart Doggett

(Facing page and above) Wardens in basic school learn the special skills needed for their law enforcement activities. These are later reinforced at special in-service schools.

(Below) One day, all the training will be put to the test as the warden is thrown into potentially dangerous—even life-threatening—situations, requiring swift and effective action.

Stuart Doggett

this appointment, the applicant is tested physically. This is a very light program which is designed to identify serious physical problems that would prevent the candidate from completing job assignments. The final and most significant tool is the background investigation. In this investigation, we seek to learn about community relationships and qualities of character which will enhance or weaken one's ability to function in law enforcement.

With the results in, the final act of separation has been completed and the estimated five hundred applicants are reduced to the few who will be hired.

So, for the successful applicant, nothing remains but the notice, "Please report to Basic School, May 2, 1982." □

Selling Your Wildlife

Major Gerald Simmons, Assistant Chief
Law Enforcement Division
Mel White, Information Officer,
Education Division

Jack Cullom* sat down to dinner in his suburban Alexandria home. Mrs. Cullom's offering that evening was simple fare: a green salad, a venison roast, baked potatoes and green peas. Apple tarts and coffee rounded up what was an uneventful Wednesday evening meal for Jack and his family.

In almost all respects, Jack is an upstanding citizen. He's a federal employee with an enviable work record, collects stamps for a hobby and plays tennis for exercise. Jack doesn't hunt; in fact, in his circle of friends, hardly anyone does. The venison on the Culloms' table that Wednesday evening was purchased at a Washington market. Jack Cullom is a game law violator, the end of a long chain of killing wildlife for profit!

The first link in the chain was forged in this country hundreds of years ago when killing birds and animals for the market was a common, if not always honorable, endeavor. It was a bad business from the very start. Wildlife populations cannot survive under the wanton slaughter of the market hunter. The examples are classic and numerous enough to show that greed, and not the need for food, was often the gunner's incentive. On the Great Plains, the huge buffalo was an easy target for the shooter with his heavy Sharps-Borchardt. They went down by the thousands, often for little more than the animal's tongue which was sent east to appear on restaurant menus. Egret plumes became popular. The millinery trade would pay. The market hunter went to work.

Despite the passage of laws to stop the killing of wild animals for profit, the practice never came to a halt. Although you will probably never again see "hunters" hanging from railroad cars potting herds of buffalo, some game law enforcement officials believe that more illegally killed wildlife is being sold than ever before.

Jack Cullom was probably not thinking about the history of market hunting—assuming that he even knew that there was such a thing—when he purchased that venison roast. It was simply meat for the table, meat that was a few cents cheaper than beef. A few cents for Jack, a few dollars for the butcher, a few more for the person who transported the deer, and a profit for the killer in the woods.

**Names and other biographical details are fictitious.*

Mel White

Investigation methods used by wardens range from something as simple as observing an illegal skinning shed (above) to more complex, scientific techniques such as blood tests. Right, two wardens take a deer's temperature to determine time of death.

Mel White

All of these people, from the poacher to the ultimate salesman, knew they were trading in an illegal product. The Game Commission knew it, too, and sent a team of undercover wardens to the Washington, D.C. area last year to evaluate the situation.

The results were astonishing, even to those who were aware of the problem. The wardens observed deer, ducks, geese and other wildlife being sold in large quantities at one market alone. They found that the game was coming from several areas in Virginia as well as Maryland, Pennsylvania and West Virginia.

At that point, it would have been a simple matter to have the market manager arrested and probably fined for selling illegally-captured game animals. The Commission, however, felt that that would have little, if any, effect on the slaughter in the woods.

A team of trained agents from the Commission was assigned the task of penetrating this particular "gang" of market hunters. Since it was obvious that the game was being transported across state lines (a violation of the Lacey Act) the U.S. Fish and Wildlife Service was invited to participate. The operation soon became a joint federal and state effort.

A "cover" established, the officers went to work selling deer and waterfowl to the gang of commercial wildlife killers. It was tough. The members of the gang obtained their product by going to the woods and marshes at night and killing or trapping everything they could—anything that would sell. The undercover wardens, on the other hand, had to maintain their supply with road-killed deer and game confiscated from "ordinary" game law violators. Other states helped, but this often involved long runs—driving all night to make it back with the next day's crop of loot. It took a great deal of extra effort, but no wildlife was killed to supply the undercover operation.

The game played on and the Commission team found itself involved in a web of corruption. The officers were dealing with people who would do anything to make a fast dollar. Some venison for your table, a porno film for the boys in the back room, a jug of moonshine for the ghetto, a little heroin for the kids down at the high school. Deer or dope, it all translates into money.

As part of the team worked with the gang, another part observed. State and federal agents watched the delivery of illegal game and the resulting payment to the agents. They followed, down country roads and interstate highways and across state lines, as the deer, ducks and doves headed for the market.

The operation that began by observing the market where Jack Cullom bought his Wednesday dinner ended with the arrest of 18 people on a multitude of state and federal charges.

One gang of wildlife killers is out of business. But others remain, raping the woods and marshes for profit. Reckless killers, stealing *your* wildlife. □

Spike Knuth

Wardens work on foot, in cars, and in boats. In addition to the game and fish laws, game wardens are charged with enforcing the state's boat laws.

Wardens on the Water

Gerald Simmons and Mel White

In everything from canoes to specially built inboard-outboard patrol boats, game wardens are on the water from the South Holston Reservoir to the Chesapeake Bay. Using almost 100 boats, Commission personnel patrol every body of water in Virginia.

On water patrols, wardens usually work in pairs. The patrols are scheduled for both day and night operation since part of the work is involved with search and rescue, body and property recovery and accident investigations.

A large part of the work on the water is enforcing Virginia's boating laws, encouraging safety and protecting property on the waterways. Protection of fish and wildlife is also part of the job, as is simply being helpful to the boating public. How helpful? Records show that few days go by without wardens finding and towing to safety several disabled motorboats.

Officers stop many boats during a day's patrol, checking certificates of number, P.F.D.'s and other safety devices required on board the various types of craft. While the boats are being checked, the wardens have many opportunities to give advice on safety to the boating public.

Accident investigations are another large part of the water patrol. This is sometimes time consuming as it means identifying and interrogating witnesses, operators, passengers and everyone involved in the accident. It means measuring boats, drawing diagrams and filling out forms. It often means several trips to hospitals, interviewing doctors to determine the extent of injuries to the victims of accidents. It also means, should there be a fatality and an unrecovered body, days or even weeks of searching. After the body is found, there are more reports to be filed.

Game wardens have a large part of the responsibility for locating lost boaters, and boaters who have had engine trouble and failed to return home on time. On the inland bodies of water they have virtually the entire responsibliity. This means long hours, usually at night and sometimes in adverse weather, of searching large lakes without any clue to where the lost individuals might be. Boaters should always tell someone as precisely as possible the area in which they plan to boat, to make their rescue easier and quicker should they have engine trouble or become lost.

In 1981, Virginia's wardens checked 45,224 boats and traveled 103,594 miles by boat during the year. Boat patrol is considered one of the most tiring activities for the warden. Eight or 10 hours in a boat on a hot summer day may be pure fun to the boating public, but it is pure work to the patrol officer.

The next time you go boating and see a Commission Patrol Boat, wave to the officer and remember he is there to protect you and your property while you are enjoying Virginia's lakes and rivers. □

Education Division

The Task at Hand: Environmental Education

Harry Gillam, Chief
Education Division

Recently I ran across a quotation in a 1923 issue of the *Game and Fish Conservationist* (which later evolved into *Virginia Wildlife* magazine) laying out a plan for educating Virginians about wildlife.

> The teaching in the schools of the fascinating study of wild life will produce a generation of young people who will be more inclined to obey the laws.
>
> The plans of this campaign contemplate the use of steropticon views and perhaps later of moving pictures. The beauty and charm of the birds of rich plumage will be shown; the value of insectivorous birds will be made clear and there will be graphically pictured the methods by which they may be fed and sheltered in times of drought and storm; the habits of birds and wild animals, their devotion to their young, their intelligence, their instincts of home building and migration and the many facts which render the study of wild life so thrilling and absorbing.
>
> To the impressionable minds of children such information will bear fruit in the lives of these children which is certain to be reflected in better laws and in the better observance of law by each successive generation.

The Virginia Game Commission has been trying to meet environmental education needs for a long time. I am sure that today's citizens are much more enlightened than they were in 1923. However, forces have been working against adequate environmental understanding. The problems are becoming more complex because of population growth and because of increased knowledge. Back in 1923, you added chlorine to the drinking water and the people were happy it no longer made them sick to drink it.

Today chlorine is suspect as a carcinogen, the water may also contain toxic wastes, and some people would not be happy unless the water also contained fluoride for prevention of tooth decay. Further inhibiting the dissemination of environmental knowledge is the loss of contact with natural systems that our urban lifestyle has brought about. Our parents and grandparents learned things through everyday observation that today's children must be taught. Despite these setbacks, we are still working on it.

The basic challenges may not have changed much since 1923, but Virginia certainly has. Today's population is better educated and more mobile. They have more money to spend on recreation and more leisure time. They are bored by much of the output of New York and Hollywood's top entertainment producers let alone the best a game commission can bring to the screen. They are besieged by elaborate four-color magazines on almost any subject imaginable. They are a tough audience, but are badly in need of the basics about natural systems and our human relationships to them.

We in the education division are trying to move with the times, taking advantage of modern economical four-color printing and improved film equipment. Just recently we purchased a video system allowing the production in the field and in studio feature TV productions on wildlife and its management. It is hoped this will help bring to Virginians in a dramatic way the status of Virginia's wildlife and current efforts in its behalf. It should also help our citizens, sportsmen, and non-sportsmen alike, to appreciate the abundance and diversity of wildlife we do enjoy in Virginia.

The income tax refund contribution plan will, for the first time, allow non-sportsmen to buy a stake in management and preservation of the state's wildlife. The funds thus generated may allow our working with teachers and children to instill a greater interest in and appreciation for wildlife.

"Such information will bear fruit in the lives of these children." □

(Below) An exhibit like this one at a National Hunting and Fishing Day celebration is one of the ways the education division reaches the public with the environmental education message.

Leon Kesteloo

We Serve the Public

Mel White, Information Officer
Education Division

The phone is ringing. One of the 16 in the education division always is.

"Good morning, may I help you?"

"You sure can! My son is doing a paper for school and he needs to know how many newborn opossums will fit in a teaspoon. . ."

Answering telephone questions from the public is in some ways one of our most important services. It allows anyone with a telephone to get answers about the Game Commission's activities and policies. It provides access to information on hunting and fishing—both where to go and how to do it once you have arrived.

For more detailed information on where to go hunting and fishing, the division publishes map books with directions to our wildlife management areas as well as

Mel White

As Carol Condrey sets type on o computer typesetter, the mochine exposes imoges onto light-sensitive poper. Then, the exposed poper is "developed" in speciol chemicols, os shown here.

guide books that discuss both the location of the available hunting and fishing and the best methods for bringing home your limit. Other publications feature life history information on wildlife of all kinds, both game and non-game. Also offered are summaries of the state's current fish and game laws.

For entertainment along with your information, the division maintains a film library which now has about 100 titles. The movies are loaned free of charge to groups and schools and include films on wildlife, hunting, fishing and boating. Slide programs are also available on these subjects. These are set up for use with carousel-type projectors and some are available with cassette tape narration.

Exhibits on a variety of outdoor-oriented subjects are maintained by the division. Generally used at fairs and similar gatherings, the exhibits require a minimum 10′ x 10′ space, and a written request 45 days prior to the function is necessary.

Information officers from the education division provide programs and lectures for groups, schools, clubs and churches. Programs adapted to the needs of a particular group are provided when adequate time is allowed for preparation. Thirty days' notice is appreciated on all program requests.

A weekly news release covering the efforts and activities of the Commission is produced 51 times a year (the new release writer is given a Christmas vacation) and is sent to all newspapers, TV and radio stations in Virginia. The news release is also available to interested fishing and hunting clubs.

All of the services of the education division are free of charge and its personnel are ready and willing to help whenever possible. . .but don't ask us about newborn opossums; just remember that 14 will fit in a teaspoon. □

Producing Virginia Wildlife Magazine

Sarah Bartenstein, Editorial Assistant
Education Division

Picture this: innumerable writers criss-crossing the state scouting for scoops—each accompanied by a photographer with several cameras and huge lenses dangling from his neck—calling their stories in to several crusty, veteran, Lou Grant-type editors who sit behind massive desks with several phones jangling in the background. One of them shouts, "Copy boy! Take this down to Composing!" "Composing" is a veritable harem of typesetter operators churning out column after column of type. The copy boy runs the type from composing to Paste-Up, where an army of artists is creating graphics and pasting up mechanicals. The clerical staff and accountants are keeping the books, acknowledging the manuscripts, keeping the ship afloat.

From the looks of my mail, this scene, straight out of "Lou Grant" or "All the President's Men," is the mental picture that the average reader has of *Virginia Wildlife*'s staff and production.

Would that it were so. I suppose I should be completely honest, however, and admit that, before I got into the magazine business, the image portrayed above was not too far from my own mental picture. The first magazine job that I landed was in a tiny office with four rooms. I was incredibly disappointed when I walked into the office for my interview; that disappointment turned to amazement once I began to work there and realized what a handful of people in four cubicles could do toward producing a magazine.

Francis N. Satterlee

Today I am even more amazed. An even smaller handful is producing a monthly four-color magazine. The *Virginia Wildlife* offices seem huge by comparison, but they still aren't the Washington Post. Nor should they be. One of the things that confuses and surprises people about the difference between a newspaper office and a magazine office is that the average newspaper office is actually a *plant*. The newspaper is actually *printed* on the premises: plates are made of the pages and the paper rolls off the presses, day in and day out. You can see that it wouldn't be practical for a monthly magazine to have its own press, especially when the art has to be color separated with very sophisticated, specialized equipment.

So a magazine—any magazine—takes up less room in terms of offices than you might think. There goes one of your illusions!

The other illusion so many readers have is that the magazine is produced by a great many people. In a sense, this is true: many people contribute to the final product. But when you're talking about full-time staff people who are with the job from start to finish—well, you're talking about three people. Yep, three.

We have a full-time typesetter who typesets all the copy for *Virginia Wildlife*. She has other duties as well—she typesets all Game Commission publications, such as the game law digest, the motorboat owner's guide, the *Sportsman's Calendar*, and so forth.

The art director plans the layout and design of the magazine, and works with the typesetter to get the product she wants, specifying typefaces, type sizes, positioning, and so forth. She pastes up the mechanical "boards" (which are not 2 x 4's, but large sheets of heavy, coated, ruled paper) from which negatives will be made for printing. She selects photographs, crops them, decides upon placement, and often takes photos herself—when she can squeeze in the time! Occasionally, she'll do a painting or drawing to illustrate an article, but that's a real luxury. She buys artwork and photos from freelance artists for the cover and for *Virginia Wildlife*'s photo files. She generally sets the tone and standard for design of the magazine, and is the liaison between the magazine staff and our vendors—printer, color separator, and any other contractual services needed to produce the magazine.

The assistant editor is responsible for editing all magazine copy, sending it to the typesetter, correcting the typesetting, and sending the corrected version to the art director for paste-up. Once the copy is pasted up, the assistant editor proofreads the mechanical paste-up boards to make sure that everything is placed correctly, that photo credits have been given, captions are under the right photos, pages have page numbers, and so forth—and she also makes one last check for typos. When she isn't editing or reading proof, the assistant editor is acknowledging receipt of all manuscripts, photos, and art submitted to the magazine on speculation. She passes the art and photos to the art director for her review, and retains the manuscripts which she reviews herself. Once decisions have been made about free-lance work, it is the assistant editor who returns the work not chosen for publication, and files the accepted submissions for future use. She also authorizes payment for accepted work and determines the amount. The assistant editor writes a monthly column and gathers all of the other copy for departmental pages from staff writers. When time permits, she answers the letters to the editor and decides which ones will be included in the magazine each month. After the magazine is published, she sends complimentary copies to each of the contributing writers, photographers, and artists. She retains the manuscripts in the file, but returns all artwork to its owners.

Overseeing the entire operation is our own Perry

William Propert

(Left) The last steps in the production process take place at William Byrd Press in Richmond, where the magazine is printed and folded on a web press like this, then bound and mailed to you.

(Left) The Virginia Wildlife staff, (l. to r.) Robin Schroeder, Harry Gillam, Sarah Bartenstein and Mel White, plan the next issue of the magazine at a layout meeting.

White—Harry Gillam, the editor-in-chief.

Now you know what each person does, but how does it all work together? Here's the chain of events;

Since *Virginia Wildlife* publishes such a large percentage of freelance articles, the first order of business is to buy articles. We receive dozens of unsolicited manuscripts weekly. Periodically, we read these manuscripts to decide which are suitable for publication. Often, this requires consultation with other divisions of the Commission. For example, if a writer says something about deer populations in Virginia, we check it out with our game division before making a decision on the article. After all, *Virginia Wildlife* is the official publication of the Game Commission, and while the opinions expressed in the magazine's freelance articles do not necessarily reflect those of the Commission, we have a message to get to the public, and we try to be consistent with that message.

After the selection process, we file those stories purchased by subject. Each article has a corresponding sheet entered in a manuscript notebook. Once or twice a year, the editor and assistant editor go through the manuscript notebook and schedule articles for publication for the next six to 12 issues. Each issue has the same number of color and black and white pages, and we have a formula of sorts: we aim for a certain number of pages of game and fish management articles, a certain number for hunting and fishing, a certain number for natural history, and so forth. Many factors dictate which articles are scheduled. The season of the year is important, naturally: a deer hunting article doesn't go in the May issue. Also, those articles which already have color photos accompanying them are assigned to color pages. We also have departmental pages and regular features to work around. Many articles do not have accompanying art or photos, so the art director must scout some art or do an illustration or photo herself. Since the amount of time she has to do this is limited, the publication schedule for a given issue can only have so many "unillustrated" articles. As you can see, there are many factors that determine which articles are published when.

After scheduling comes editing, closely followed by prelayout and layout. The three editors, the art director, and the staff photographer get together each month to go over the articles scheduled for a particular issue to determine art needs and generally to make sure that everything needed for that issue is in order; this is the "prelayout session." By this time, the editorial staff has edited the copy and the typesetter has composed it in its "first run" stage. She gives "galley proofs"—that is, typeset columns that have not been pasted into a format on a page—to the assistant editor. The galleys serve two purposes at this stage: the assistant editor uses them to proofread what the typesetter has stored in her computer, and the art director uses them to gauge the length of the articles so she'll know how to place them on her pages and can make layout plans. That's what the layout session is for: the staff looks over the available photos and art and the galleys, and the art director offers ideas for layouts of each article. The art director and the editorial staff work together on titles and "blurbs" that will be appropriate to the content of the article and to its graphic treatment. Once the photo decisions are made, the editors write captions for each. The art director sketches all the ideas into a "dummy" layout book, and follows these sketches as she does her paste-up. In a nutshell, the layout session is an exchange of ideas and a blueprint for the art director to follow.

From there, things begin to move quickly; the assistant editor returns the galleys to the typesetter with corrections marked. The typesetter runs out a final copy of the corrected texts and gives them to the art director, who pastes them on mechanical boards. She sends boards, photos, and all instructions for placement and cropping to a company in Florida that does our color separations and litho work. From Florida, huge negatives and color separations go to our printer. The printer makes plates from the negatives which go on a press and the magazine rolls off the press on gargantuan sheets of paper. The paper is folded, cut, bound—and mailed to you as a magazine.

That's a very simplified version of how we put it all together. In between, we have other less glamorous things to do—like answer letters and phone calls, type invoices to send to freelance writers, artists, and photographers, send complimentary copies of the magazine to the freelancers whose work appears in the magazine, returning art and photos that have been published, and on and on.

I hope we haven't spoiled it for you by giving you a peek at how the magazine you're holding came to be. It isn't magic—it just seems like it sometimes. □

Francis N. Satterlee

Harry Gillam

Mel White

(Upper left) Lou Hinshelwood, assistant to the audio-visual supervisor, edits videotape at a console in the division's new television "studio." (Extreme lower left) Hunter education courses include instruction in bowhunting and the use of primitive weapons. (Lower left) Harry Gillam films a bowhunter in action for the videotaped hunter education series shown this fall on public television.

Safety: Educating the Outdoorsman

Harry Gillam, Chief
Education Division

The role of sportsman's education will become increasingly important in future years. Modern parents often don't seem to have the time or opportunity to properly introduce their children to outdoor sports. As a result, many as teenagers or adults become active hunters, fishermen or boaters without proper regard for traditional and ethical behavior. Not knowing how to safely use their equipment, they are often a danger to themselves, to fellow recreationists and to others in the community. These factors, more than lack of game or fish, may curtail these sports.

Our hunter education program has been re-designed and expanded to meet these new challenges. Although 27,917 students were graduated during the 1980-81 fiscal year, the major effort was on "training the trainers." Six lieutenants from the Game Commission's warden force were certified to train instructors in their respective districts. In turn, they trained 229 new instructors, bringing the number in the system to 514. Existing instructors received training in ethics and advanced teaching methods. Through the National Archery Association, the same lieutenants earned qualification to train instructors in bowhunting.

Virginia was fortunate in being chosen as the site of an NRA Professional Staff Academy. Top instructors were brought here to present the latest in teaching techniques and training methods to professionals from all parts of the Eastern seaboard, including nine from Virginia. As a result of this and other training during the year, eight people from the Game Commission qualified for Master Instructor status, the highest level offered.

Emphasis is being placed on revising the instructor training program to take advantage of the new training ideas and expertise. Plans are to train fewer instructors, but train them more thoroughly. A teaching mandate will give instructors more incentive to participate in the program or lose their credentials.

Instructors have a great array of new equipment to use in teaching, ranging from projectors to videotape and including a full set of demonstration guns and archery tackle. Included in the training program are more workshops to sharpen the skills of instructors already on the rolls.

Neither is boating safety education being neglected in Virginia. The Commission of Game and Inland Fisheries cooperates closely with the U.S. Coast Guard Auxiliary and U.S. Power Squadron, supporting their outstanding boating safety education programs.

Game wardens and other Commission employees have access to a short boating safety course, and a slide program is available to accompany the Commission's *Better Boating Guide*, now used in a number of schools.

The staff is working on instructor and student manuals for a six-hour, high school-level course similar to the hunter education course.

Videotape may prove useful in dramatizing waterway situations in the classroom. Plans to produce a series on boating safety for television broadcast have been placed on the back burner due to cutbacks in federal funds for boating safety. □

The Television Option

Harry Gillam

The first time I saw those vibrant colors pop upon the screen, I knew the Commission's new portable color TV unit was going to open up the most exciting medium available for telling wildlife's story. Nature is full of colors, shapes, and sounds, and this equipment would allow us to bring all this splendor and excitement to the home TV screen.

The heart of the new system is a JVC KY2000 color camera. It weighs a mere 20 pounds with its portable battery and has a 10 to/zoom lens for bringing wary wildlife up close. A companion piece is a Sony 4800 portable videotape recorder, which faithfully captures the color image and the on-scene sounds. This weighs 23 pounds, so the whole rig can be carried by one person (although it is a bit of a strain).

Backing this up are studio editing facilities so programs can be assembled, ready for the air. A Buhl Mutliplexer allows us to transfer existing movie footage and slides to videotape. It is quite rewarding to rush from the field to the studio and see the images instantly come to life on the screen.

Among the plans for this new equipment is production of a TV program much like *Virginia Wildlife* magazine which will explore several aspects of Virginia's outdoors each week. Included will be natural history facts, what's going on in wildlife management, where to go, and ways to more fully enjoy Virginia's outdoor heritage.

Its usefulness will not end there, however. Videotapes will become an integral part of our hunter education program, helping to bring field experiences and expert instruction into the classroom. Special productions will be useful in training game wardens and other new employees.

Then there are public service announcements which will be easily produced to help make the public more aware of safety, law changes, and wildlife issues.

Working with video is an exciting prospect with seemingly endless possibilities. This may well prove to be the most versatile tool the Commission has ever had. □

Administrative Services

Administrative Services: An Overview

Sam Putt, Chief
Administrative Services Division

"Information management" is a current term describing a large part of what is done in the Commission's administrative services division.

The collection and analysis of information is a vital part of any organized effort and the growing complexity of effective management has dramatically increased the demand for accurate and "digestible" information by decision makers.

With a staff of 25 people, the administrative services division manages the Commission's $12 million annual budget, processes all purchase orders and payments for goods and services, maintains personnel and pay records for 400 employees, serves as a channel of fiscal communication with the federal government, supplies and accounts for two million hunting and fishing license sales through 500 outlets statewide, maintains transaction histories and registers 140,000 motorboats, creates and maintains accounts for 52,000 subscribers to *Virginia Wildlife*, and maintains the grounds, telephone, heating and air conditioning systems.□

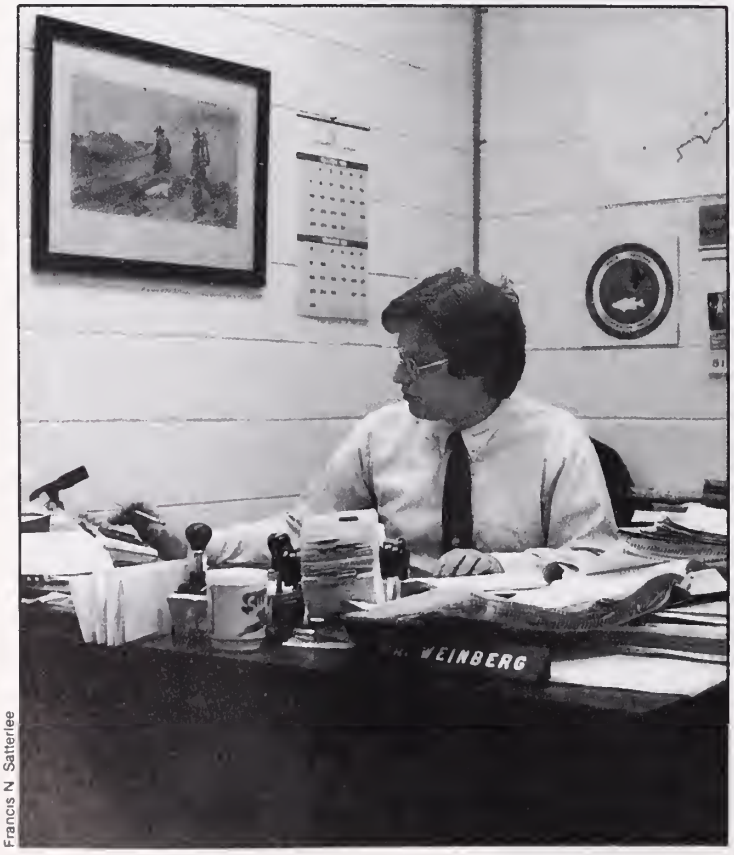
Computer Technology Comes to the Game Commission

Harry Gillam, Chief
Education Division

Type in the words *Virginia Wildlife*, punch the search button and all 1980-81 expenditures for the magazine begin scrolling up on a viewing screen.

I was watching a demonstration of the Game Commission's new IBM System 34 computer. The system was installed in late June and programming has been proceeding methodically since. "We are doing our own programming because outside programmers don't fully understand the job to be done," said Sam Putt, Game Commission

(Below) Assistant chief of administrative services Howard Weinberg labors over the Commission budget. (Right) Computer operators Kitty Preston and Dale Lewis process Virginia Wildlife orders.



Francis N. Satterlee

administrative officer. "This lack of understanding can cause problems," he added.

Although subscribers would have little reason to notice, mailing labels for *Virginia Wildlife* have been printed on this system since November. With names and subscription data stored electronically, response time on subscriber inquiries will be substantially reduced.

The machine contains two magnetic disk drives, together capable of storing *128 million characters* of information. "Its capabilities are virtually unlimited," says Putt, who has been doing most of the initial programming. Data processing supervisor Jack Cox is being trained as lead operator and is learning programming. Former key punch operators Kitty Preston and Dale Lewis will operate data entry stations.

"This machine could save the Commission $100,000 over the next six years," estimates Putt. This will come from reduced maintenance charges, plus saved postage, time, and space. The entire *Virginia Wildlife* file which used to fill a dozen filing cabinets fits in a diskette pack you can hold in one hand. "Perhaps more importantly," he added, "it may allow us to implement our new boat titling mandate without adding any more personnel." Retrieval and processing time for boat registrations and titles should be greatly reduced and the information will be much more quickly accessible. Plans are to discontinue the issuance of temporary registration cards since the new equipment will prepare permanent registrations while the customer waits.

Hunter education records are a function soon to be turned over to the new computer. From a console in the education division, the operator can punch in a name and verify when a person completed the Hunter Education Course. Also available will be records of instructors, including how many students each has trained and how much training the instructor has had himself.

Eventually, the agency's accounting will be transferred from a small accounting computer to the big machine. Division chiefs will have up-to-date financial data at their

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(Below) Accountant Frances Boswell and Wren Hanks, personnel, confer on the Game Commission payroll. (Following page) The administrative services division works with all other divisions to obtain goods and services. Here, accountant Scarlett Mustain helps law enforcement's Lieutenant Herb Foster check in on order for his division.

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fingertips with a terminal in each division. This will result in more accurate budgeting and better financial control. Inventories with the capability of instant retrieval are another possiblility.

"It is certainly the most powerful and versatile tool the agency has ever had for managing its affairs," says Putt. "The possibilities are exciting!" □

The Latest in Boat Section: Titling

Nancy Jamerson, Boat Registration Supervisor
Adminstrative Services Division

The 1981 session of the Virginia General Assembly passed a bill which requires all watercraft 15′ and over in length and weighing in excess of 400 pounds, including motor, to be titled. The mandate took effect January 1, 1982.

Watercraft requiring titles which are currently registered will be titled when the registration is renewed.

Titling will not change registration requirements. All boats propelled by machinery when used on public waters in the state of Virginia must be registered and numbered.

Owners of watercraft acquired after January 1, 1982 must obtain title and registration after paying a two percent watercraft sales tax. This is a reduction from the four percent tax previously required.

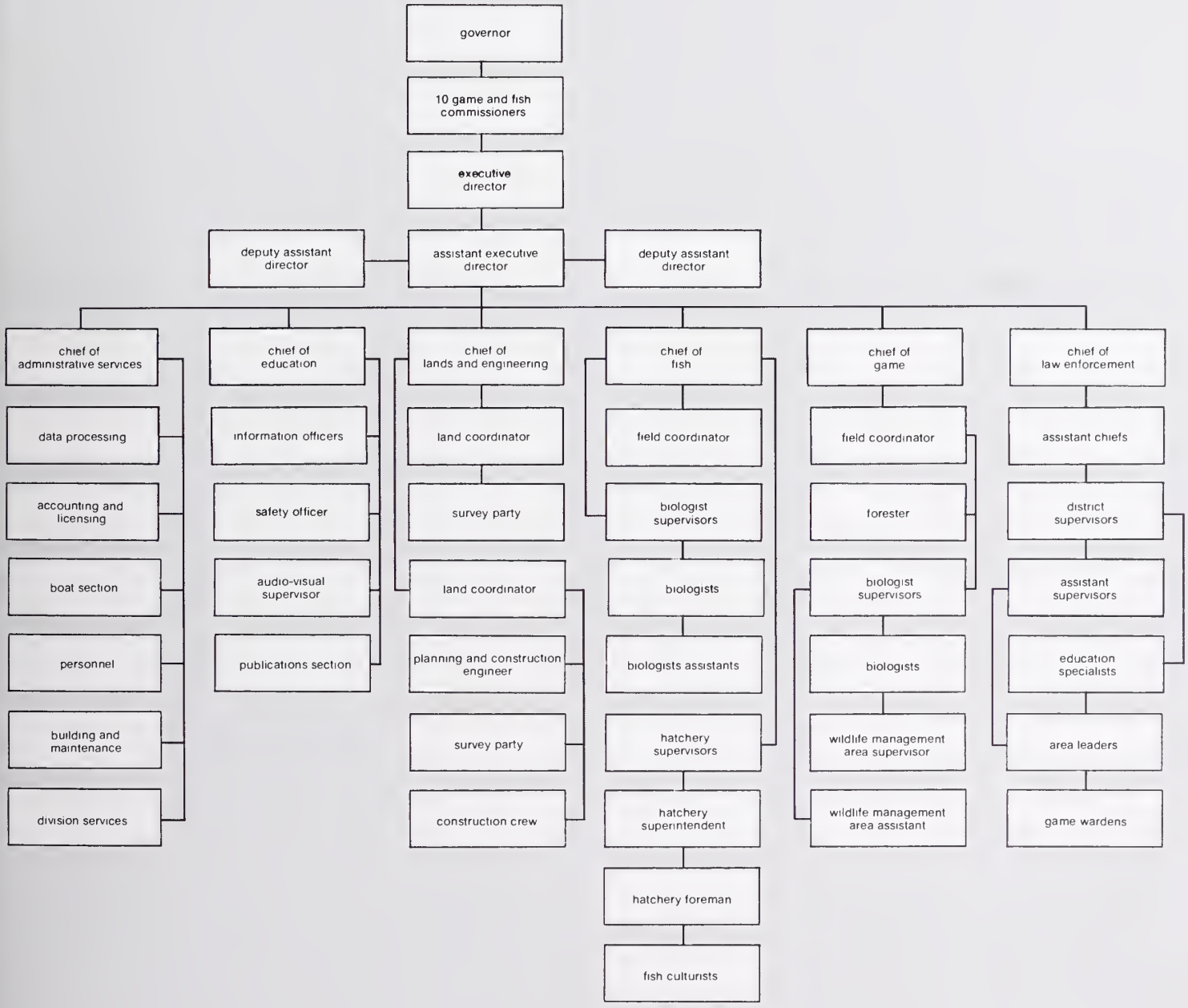
The sales tax may be paid in one of three places: to authorized dealers for watercraft they sell, to the offices of the Virginia Tax Department, or at the Richmond office of the Virginia Game Commission.

There are 153,000 motorboats currently registered in our state. All registrations are processed in the Richmond office at 4010 West Broad Street. Boat registration/titling applications may be submitted either in person or by mail. Applications are available through marine dealers, some agents who sell hunting and fishing licenses, and from the Game Commission.

The fees are $7.00 for titling a watercraft and $11.00 for registration. □

Mel White

Organization



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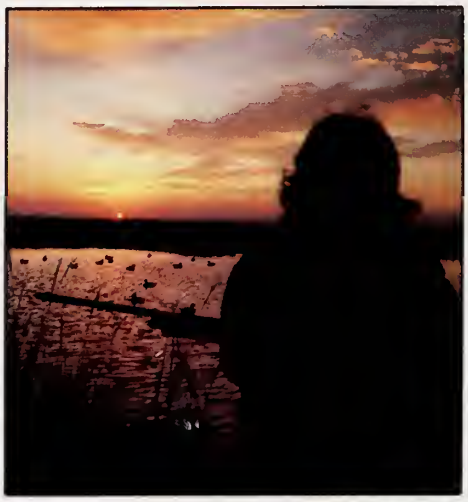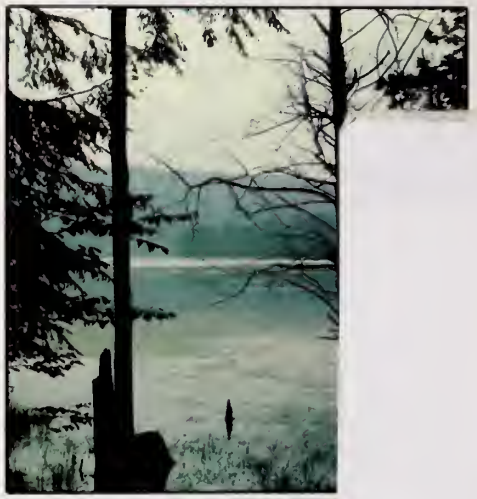
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